INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

SEPTEMBER 1940

Volume 29 **Number 7**

As Schools Reopen

A glance at world conditions proves that the much-vaunted advances in science and invention have not bettered man morally and spiritually. Truth, honesty, justice, altruism, are ideal concepts which may be understood by many but are practiced only by the few.

With so much uncertainty about us, both at home and abroad, the teacher's responsibilities are indeed appalling. Past experiences show that the present generation will not change and accept the dictums so necessary to secure universal peace, security, and progress.

It is up to the teachers then, to so educate youth that the man of the future may better understand his duties, and be more willing to altruistically shoulder the burdens which they impose, so that strong and weak alike may live together peacefully, contentedly, and amicably.

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION welcomes back its readers to assume these duties. May their work with the youth of our land do much in securing that lasting civilization of which mankind is so much in need.

Projects Number

As a special service to our readers, it has been decided that the November number of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION will be entirely devoted to projects suitable for the school and the home shop. The number of pages in the special issue will be much increased, and it is hoped that the choice of projects will be helpful to all who are interested in industrial arts, vocational education, boy-scout and boy-club work, and camp and home-shop work.

The Type Used in This Magazine

The heads of main articles are set in 36-pt. Lydian Roman, and the authors' names in 14-pt. Lydian caps.

Heads for articles on tests and testing and on problems and projects are set in 14-pt. Lydian Roman, and the authors' names in Caslon Bold.

Legends for all cuts are set in 8 pt. Metro Light.

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INDUSTRIAL ARTS and VOCATIONAL EDUCATION

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Place, Program, and Function of Industrial Arts

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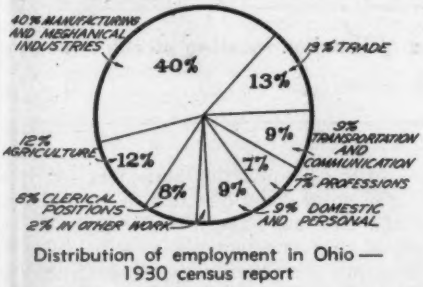
The Place

Fifty years ago only a small portion of our youth were receiving a high-school education. The classical or academic curriculum then offered in our high schools was fairly well suited to the needs of the few who were quite sure to find a place in one of the professions. Recent figures show that we have an entirely different condition, as far as enrollment is concerned, in our high schools today.

Increase in high school attendance in millions. Taken from biennial survey of education — 1932

Since 1910 our high-school attendance has doubled each 10 years, while our population has increased about 17 per cent each ten years. This rapid increase in the enrollment has within it certain implications which have a definite bearing on the selection of subject matter for the curriculum. Recent figures from the Director of



Distribution of employment in Ohio — 1930 census report

the American Youth Commission at Washington, indicate that not more than 12 per cent of our youth can hope to secure adult employment in the professional or semi-professional field.

This certainly means that a large proportion of our youth must look to nonprofessional fields for employment as already indicated. Have the schools changed to meet these conditions?

Education is a preparation for living in the sense that it develops certain abilities which help the student to make adjustments to meet the conditions of his environment. Living involves an enjoyment of living through an ability to earn a living and to be of service to others. To achieve this goal, the curriculum of the school must be organized according to the present environment. Much of the traditional curriculum meets present-day needs and should therefore be retained, but much that is new should be added to meet the changing conditions.

Without detracting at all from the inherent values in other fields, *would it not be wise to have a larger share of a child's school experience in the field of industrial arts?* All children born today find themselves in an industrial world with its many problems. More ways of earning a living, greater division of work in the industries, demanding specialization, greater interdependence of industries, and a greater dependence of the consumer on the integrity of the producer, are only a few of the problems to be faced. If the schools are to respond to the needs of their environment they must provide courses which will guide pupils in the direction of solving these problems. A better understanding of the processes, relationships, and problems of industry will accomplish much. Here is the place for the industrial-arts phase of education to make a direct contribution. *It can, and does, develop better understandings of the industrial age and prepares the individual for a place in an industrial society.*

The responsibility for education falls on the administrators of the public schools. Boards of education have a twofold responsibility, first to the present members of their community and second to future members of society. They must provide the opportunity for the best educational experiences possible with the least possible expense. The following is an answer, as far as industrial arts is concerned, to this responsibility:

The Program

The Ohio State Department of Education requires all its first-class high schools to offer two units of industrial arts, but it recommends four. Many schools, not only in this particular section of Ohio, but in all parts of the country, are introducing more units of industrial arts. It is definitely the trend.

The fact that the trend is toward offering a wider variety of work is important, but why should we offer more industrial arts? The schools already have a reputation of offering too wide a variety of courses. Perhaps an explanation of what we mean by a general shop, which is the term given to the room in which this wider variety of work is offered, will help to answer some of these questions.

As to the *physical make-up*, the general shop is a room equipped to provide experiences in many phases of industrial-arts work. The shop is usually divided into areas, in each of which is located a part of the class. This makes it possible to offer a wide variety of work with a comparatively small outlay of money. For a class of 24 students in a shop offering 6 areas of work, each area would need to be equipped for only 4 students.

As to *the philosophy involved*, the general shop provides an opportunity for the boy or girl to study several materials in their relationship to each other and their relative importance to industry. It provides an opportunity to investigate and explore many fields of endeavor and develops an informational background which is essential to a well-rounded education. Here, because of the opportunities for comparison, it is possible for the student to discover or develop an intelligent dominant interest for possible specialization. He can develop a wider variety of tool skills. He has contact with processes which are basic and can develop a method of working (planning) which should help him in many fields of endeavor.

If we consider the many fundamental experiences involved in such an industrial-arts shop, can we justify a shop or course which is limited to only one ar two ma-

terials and the industries represented by them? On the other hand, to attempt to include all the materials and industries that exist at the present time would be humanly impossible.

It, therefore, becomes necessary to make a selection. This selection should be made on the basis of what materials play the most important part in the daily life of any particular community. This does not necessarily mean that only these industries located in a community should be studied, but rather that these industries whose products play the most important part in the life of the people which make up the community be included. The units selected should then be considered as areas of the field of industrial arts rather than as separate courses such as woodworking, metalworking, etc.

When the areas have been decided upon, a definite plan to carry out the idea must be set up. It must be known just what is to be done and then this must be carried out at the earliest possible opportunity. This does not mean that the entire plan must all be set in motion at once. The cost in many cases will prevent this, as will the added load on the teacher. However, the obstacles that arise may be overcome by a gradual development of the plan such as, adding one new unit each year until the goal has been reached. This would mean purchasing, according to the plan, only such equipment as will be used in the completed shop. With this small amount of equipment the shop will not function as perfectly as it will when all the plan is completed, but this is a small factor when the added benefits are considered. *We have then a means of providing a richer and better program of industrial arts at little or no more cost to the community than a program which offers only one or two areas.*

The Function

Educators often fail to realize that industrial-arts teachers work under the same difficulties which other secondary-school teachers meet, when their students are unable to read satisfactorily, write reasonably well, and think intelligently. Desirable outcomes in industrial arts are not attainable without these abilities any more than they would be in the other subject fields.

Why do pupils need these abilities in industrial arts? They need to read and understand instructions, study about the materials of industry, read about tools and machines, and become informed about the many ocupations in industry. They need to write specifications for the jobs they choose to do in industrial arts, to figure costs, to formulate and write out procedures for doing the jobs, to write and give reports on their reading, and to write on tests and examinations just as they must do in other curriculum fields. They need ability to think in planning the procedure of constructing the selected project, to think intelligently about their qualifications for a vocation, and to decide on the best preparation for a selected vocation.

The manipulation of tools and materials constitutes the major physical activity of pupils in industrial arts, but the tendency to wholly evaluate the results of these activities according to the manipulative skills developed by the pupil and by the quality of the projects constructed is entirely wrong. The best possible development of skills in industrial arts is desirable, *but these can be attained without very much learning taking place.*

Students are not always given the challenge in industrial arts which fits their capacity, and consequently they are not interested in that field of the curriculum. Industrial arts is not necessarily a subject for the mentally deficient or for the *slow* pupil, unless a special consideration of the organization of the course is made. It offers to the best of the students a challenge to their ability to think and make adjustments, when it is conducted in a manner which emphasizes living in an industrial environment.

Industrial arts is much more than it is given credit for being. It is not a subject in which the students only learn how to make things. It is not a vocational subject, it does not exist for the purpose of teaching boys how to repair furniture, make it, how to build a house, or any other type of construction. All these things are possible and will be outcomes of the course, to a certain extent, but they are not the primary reason for teaching industrial arts.

The subject has been defined as a *study* of the changes, made by man, in raw materials to increase their value, both monetary and aesthetic, and of the problems of life related to making these changes. It should include a study of these processes of industry, the conditions under which these processes take place, the vocational possibilities of these industries, what relation the industry has to man in his daily life, and the like. It is a *social* subject and *should be a contribution to the general education of every student who expects to live with, and use, the products of industry.* In other words, we in industrial arts, are more interested in the industrial side of life, the how and why of industry, rather than in the perfectly made articles which the boy produces in the process of studying these industries.

State Associations of Industrial-Arts Teachers

JOHN ALLEN WHITESEL

Teachers College of Connecticut, New Britain, Connecticut

A paper read at the Milwaukee meeting of the American Industrial Arts Association.

There are two entirely compatible and essential types of state programs in industrial-arts education. One type may be operated by representatives of a state department of education, while another more comprehensive type is that made possible by the efforts of many individuals working together democratically in associational groups.

This paper presents an initial statement for the American Industrial Arts Association. It lists and discusses some of the many principles involved in the organization and conduct of associational groups and programs in any one or all of the various states. This pronouncement comes as a result of an extended study of the policies and practices of each of the state organizations. Special consideration has been given to those programs that have shown the greatest professional accomplishment. The results have been carefully checked by twenty-seven experienced industrial-arts leaders from all sections of the United States. Every effort has been made to refine this statement for it is intended to clarify and give professional direction to the activities and programs of any and all state groups. Any suggestion for the further improvement of this statement will be most welcome.

The various state industrial-arts-association programs differ in many respects. There are, however, certain common characteristics and underlying principles that can be grouped for purposes of analysis into such headings as: essential nature and purposes, organization, financial practices, conferences and other meetings, research, publications, experimental demonstrations, various types of relationships, and evaluation or appraisal, all of which will now be presented in order.

Essential Nature and Purposes

Certain of the state programs are operated through the efforts of several organizations or groups while others result from only one organization. Regardless of the number of groups contributing to a state-association program, there should be some means of co-ordinating and directing these into one professional program. One of the most successful ways of doing this is by a state advisory or steering committee. Such a group helps give professional direction to the program. It is important that this be a scholarship group and that it have professional maturity. A committee should have representation at least from teacher education, from teachers and administrators in urban programs, from teachers and administrators in rural programs, and from the general instruction or educational areas of the state department of education.

The first purpose of any program should be to stimulate a widespread interest on the part of teachers, administrators, and laymen in the constructive development of industrial-arts education in their state. Such an interest can be accomplished through a year-round program of several types of activity and not just by an occasional or annual meeting where speeches are made to static audiences, after which everyone goes home and nothing is heard or done until the next year.

The intrinsic nature of a state-association program of industrial-arts teachers should be to foster, develop, and evaluate industrial arts as general education. A state program must obviously assume an active continuous role and not be sporadic in its activities. There is a common responsibility for giving direction to industrial arts within each of the states as well as within the nation.

Organization

The organizational detail of a state program for industrial-arts teachers should be kept as simple and as flexible as possible. Care must be taken lest the energy of industrial-arts men be consumed in maintaining a complicated and frequently ineffective machine. The challenge is, what important elements are conceived and actually accomplished in a program in any one year. Except in very small states, there should be local or district organizations to plan and conduct a program of meetings that will be generally available to every teacher several times throughout the school year. These local or district industrial-arts organizations should be affiliated with that of the state, as well as the American Industrial Arts Association, both of which are and naturally should be affiliates of the state and National Education Associations. Industrial arts does not and cannot stand off to itself as in an educational dualism, but must be an integral part of the entire fabric of American education if it is to come into its own.

The membership of a state industrial-arts association should be open to any professionally interested person. Great care must be taken, however, to insure the election of officers and committee members on the basis of real professional merit and their ability to produce results. Individuals on committees such as those on research and developmental programs, should have an opportunity to work continuously for a year or more. While it is not intended that any state group be self-perpetuating, it is recognized that good association programs of industrial arts frequently are prevented by the annual change of officers and committee members. Any failure to select and use the finest personnel tends to lessen the effectiveness of a program and a profession.

Financial Practices

If a state-association program is to exist, it is obvious that the organization must have some sort of an income. One of the chief means of building a treasury is through the medium of annual dues. State and national education associations frequently can and do subsidize special projects and programs. In addition to these are the frequent subsidies and support provided by state departments of education. Still another means of developing income is by charging for commercial exhibits and advertising space at conventions and conferences. While this practice is legitimate, the sums frequently charged manufacturers, distributors, and publishers are exhorbitant and such practice is contradictory to the professional tone that should prevail. After all, teachers must pay their way if they are to have and control a strong profession.

An organization must expect to meet all legitimate expenditures in connection with the operation of a program of industrial arts. All speakers engaged for formal services probably should have their expenses paid by an organization, although there is a difference of opinion over how much of this can be done. Participants coming from outside a state should also have an honorarium. Budgetary provisions should also be made for conferences, research, and publications.

All financial matters should be handled in an entirely business-like manner. While it seems obvious that there should be a standard system of accounting and auditing, such is not the case in far too many of the states.

Conferences and Other Meetings

Conferences and other state meetings held during the year typify American practice. At least one annual state conference should be held in connection with the state education association. Local and district groups should plan and hold a series of meetings throughout the year. Some of these should be of an informal nature and broadly participated in by the industrial-arts teachers themselves. Such programs should provide a balanced variety of technical, professional, cultural, and social values. Speakers, especially in state meetings, should be engaged who have national ranking in education, in addition to noteworthy artists, industrialists, and representatives of labor. Besides speakers and discussion groups, other techniques such as demonstrations, exhibits, motion pictures, and school as well as industrial visits are valuable. School exhibits should have a much broader purpose than the usual practice of displaying craftsmanship. They should present a cross section of the entire industrial-arts program at work. Commercial exhibits should be of such equipment and supplies as can be justified for use in the industrial-arts programs of the state.

Research

If a state industrial-arts organization is to go forward, then it must be based on a continuous program of research and evaluation. Many people should participate in research projects, because they stimulate inquiry and foster growth. Researches may be conducted by individuals or by groups. A state or national organization should have a program of and a plan for conducting its research for which there should be funds available. Research-committee members should be representative of the best interests of the profession and allowed enough time to complete the projects they have undertaken. On the other hand, studies need terminal facilities and should not run longer than three years unless some particular values can be attributed to a five-year-long project. Research studies should point the way for the state program in such matters as statements of philosophy, curriculum, texts and references, teaching methods and devices, techniques of evaluation, physical settings and equipment, safety, and state department relations.

Publications

Important research findings of state and national industrial-arts organizations should be published and made available for the general use of the profession. Care still needs to be taken to avoid publishing pseudoresearches, results of naively developed questionnaires that can do little more than prove the *status quo* and, worst of all, an occasional so-called research effort of a biased minority. A state organization should produce and publish a description of its program and then provide accounts of its developments and other accomplishments periodically.

Other Demonstrations of a State Program

A state industrial-arts-association program must include considerably more than an annual meeting. It should provide developments that can be followed through. Addresses and reports

might well include such problems as the improvement of teacher education, the achievement of consumer literacy, as well as occupational sensitivity, the development and conduct of experimental demonstration programs, the nature and development of a county-system program, essential legislation, and the winning of professional recognition. A state program should stimulate the improvement of the qualifications of its teachers as well as clarify and improve certification requirements. An industrial-arts organization should also be active in the stimulation of schedules that will provide better salaries for its teachers. This is so essential if industrial-arts teachers are to develop their professional and cultural interests. It should also encourage the evaluation and supervision of industrial-arts teaching throughout the state.

One of the most effective devices for improving and promoting industrial arts is through the establishment of experimental demonstration programs in representative centers about the state. Administrators, teachers, and laymen can then have an opportunity to see a modern program of industrial-arts teaching in progress. However, only one or possibly two states have used this technique of leadership to any extent.

An organization should establish and foster a central demonstration set up together with a clinic for the information of manufacturers and architects as well as for administrators, school-board members, and teachers. A state organization should also have the responsibility of periodically instructing equipment-and-supply salesmen concerning the purposes and program of industrial arts, as well as making known to the representatives of manufacturers and distributors the equipment and supply requirements for a modern-day program. A state-association program should certainly include the education and supervision of architects and builders concerning what is required. An industrial-arts organization can do much toward enlightening legislative groups concerning industrial arts and also toward stimulating intelligent enactments.

Relationships

A school program cannot afford to be isolated from the community. If industrial arts is concerned with education for living in an industrial democracy, then a state-association program must reflect and use individual and community needs and resources. Happy and helpful relations should exist between the community and the state and national offices of education. There should be close relations with the various educational institutions of the state. Representation on the state committee from teacher education should result in an improved program. Furthermore, the state industrial-arts program is obligated to win and hold the respect and cooperation of the school administrators. Many other relationships such as with nonschool agencies, labor and industry, various civic and parent groups, teacher organizations, members of legislatures, and governmental agencies should be cultivated.

Summary

In closing, it should be emphasized that a strong state-association program of industrial-arts education is not likely to exist without the use of strong professional leadership. The program must also foster a plan of continuously evaluating its accomplishments and practices in an effort to stimulate professional growth and refinement, and be of ever-increasing usefulness to the children, adolescents, and adults it serves. The many points listed and described herein have operated to the advantage of the profession in various organizations about the country. Our problem is to give them universal application.

A Laboratory of Industries

PAUL E. HARRISON
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At Northern Illinois State Teachers College located in DeKalb, Ill., has been developed what is designated as a *laboratory of industries*. This development is the outgrowth of a program that is sometimes called *household mechanics* or *general shop*.

The idea behind the development of the program now in operation at DeKalb has been an effort on the part of the members of the department of industrial arts to offer boys and girls on the junior-high-school level an opportunity to have access to, and experiences with a wider range of industrial materials than is usually available for them in the existing school shops and laboratories generally found in operation at the present time.

Boys and girls of this younger adolescent group have reached the place in their development when they are not satisfied to take things for granted. They have the curiosity and the desire to experiment, to explore, to investigate, to invent, and to create interesting and useful projects, with the common materials and products of their immediate age, at a time when new and important inventions are being brought forth and utilized every day. They have seen these same inventions revolutionize our social, economic, and industrial structures over night. It should be very evident to the intelligent members of our society, that these children, as they have the urge or the curiosity, should be permitted to work with all of the things produced by our great industries for their use and convenience, on a level, and in keeping with their ability and interests.

Boys and girls are interested in using tools, and using them efficiently. They are interested in handling materials of every description and modeling them to their needs and consuming requirements. They have had little chance, in the majority of cases, to study and explore the automobile. They know so little, and yet are so curious and interested in the origin, the development, and the future of that dominating transportation vehicle, the airplane! They know nothing, we might say, of refrigeration, of the graphic arts, of the refinement and use of the fine and common metals, or of the influence electrical energy has over our daily lives. It is very seldom that they ever give a thought to the skilled labor required, the numerous materials used, or the time required to produce a commercial piece of goods. No matter whether it is the manufacturing of oatmeal, the making of a table, the forming and glazing of a vase, the printing of a newspaper, or the reading of a utilities meter, a great industrial romance is involved for them in any and all of these processes. It can readily be seen by the suggestions enumerated that the problem of consumer literacy is basically one of universal industrial intelligence.

It is the general opinion at DeKalb that boys and girls alike should have a chance to explore these developments that have been designed for their use and convenience. Thus, at an early age they may acquire, at least, an elementary knowledge of the tools, machinery, materials, and methods used to produce some of the world's products that they so habitually and so conveniently consume.

A paper read at the Grand Rapids meeting of the Industrial-Arts Section of the American Vocational Association.

As already indicated, boys and girls participate in this program working side by side in the area of their choice. Why children should be segregated for work on this level is not clearly understood by most people anyway. All of their other schoolwork, with the exception of some problems in physical education, is taught to mixed groups. Boys and girls of this age play together, work together, and live together; and they will continue to do so all through life. Why should they not learn to live and work with one another now so that they may better acclimate themselves when they enter the world to take their places, no matter what the positions may be — banker, ash collector, teacher, homemaker, nurse, or clerk. They must learn to work together at some time in their life. Why not now?

No special emphasis is placed on any one phase of the program as it now operates. More effort is placed on a general overview of industry and its products as a whole. The general aims used as a basis for the development of this program are those objectives of a general nature so frequently used as a basis for the development and justification of the more modern types of practical-arts programs. These objectives in brief are:

1. Exploratory experiences.
2. Consumer literacy.
3. Desirable personal and social growth.
4. Avocational experiences.
5. Manipulative experiences.
6. Guidance opportunities.

These objectives, it is thought, can be attained in a program of such nature where both boys and girls of this age are concerned. These objectives as stated may appear rather brief. They can be analyzed more completely if one cares to do so.

This program is housed on the second floor of the industrial-arts building on the Teachers College campus. At the present time five rooms are used to maintain the various areas in operation as integral phases of the program. These five areas are designated as: the planning area, the foods laboratory, the textiles laboratory, the mechanical industries laboratory, and the library.

The activities pursued in each laboratory may be set forth briefly, as follows: The planning area will operate to carry on all of the problems in *planning*, such as: sketching, mechanical drawing, blueprinting, and blueprint reading. A unit in *design* is also located in the planning area. This unit deals with special problems in structural and decorative design. The associated study of rhythm, balance, gradation, radiation, and relation to design of all types is a part of this area. The place and use of color as it involves the various phases of design is also included.

The *foods* laboratory includes the program in food preparation and menu planning. Problems involving the growing, distribution, consuming, canning, and preserving of foods are also studied here. Advertising in relation to the consumer plays an important part in this program. Model housekeeping rooms have been built in and furnished so that problems of homemaking may be experienced. A small laundry is also included as laboratory equipment in this area.

The *textiles* laboratory includes problems in designing, construction, washing, cleaning, care, and selection of clothing for the individuals immediately interested.

The *mechanical industries* laboratory is the largest single section involved in the program. Here are found the areas in *graphic arts, metals, woods, electricity, ceramics, and crafts.* The program in graphic arts includes two sections: one section in printing, where problems in composition, presswork, platemaking, and papermaking are studied; a section in binding, where simple types of bindings are worked out. Some rebinding is also undertaken in this area. In the metals area, problems involving the use of tin plate, galvanized iron, copper, brass, aluminum, and pewter are undertaken as individual, and as group activities. Work with mild steel is also included when applicable to the problems involved. In the area in woods, small projects are designed, constructed, and appropriately finished. As in the other areas, the work undertaken is dependent to a great extent, upon the interests and abilities of the participating groups. In the electrical area the problems involved are magnetism, bell wiring, electrical measurements, motors, circuits, and symbols. Home appliances, including safety, trouble shooting, heating appliances, and refrigeration are also a part of this area, as are problems in home lighting and communication. The work in ceramics involves modeling problems developed by the slab and coil methods. Other problems in casting, throwing, glazing, and firing also are worked out. In the crafts area, the work covers activities in leather, plastics, weaving, and problems in Indian craft. At the present time, units are being developed to cover these topics as separate activities. Other areas where experimental work is also being undertaken include *photography, wrought iron, art metal, automotives,* and an area at present called *personal living.* Here social problems of the child in his home, school, and at play are discussed, and activities initiated to help these groups solve common problems so important to them at their age level.

Another experiment that has been of more than usual interest and that has been worked out in the DeKalb program is represented by the "Practical-Arts Series" of guide books for the use in exploratory programs, especially where those programs are on the junior-high-school level.

These guide books have been developed after several years of experimenting with different types of teaching materials to find teaching aids for programs of this nature. The guides have been set up in very flexible form. They can be adapted to unit shop courses as well as to the diversified type programs. They are especially adapted to the junior-high-school level, and the greatest value is evidenced when the student is making his first contact with the industry involved.

These guides have been set up to help the classroom teacher in conducting his daily classroom work. They enrich and extend the scope of his teaching and give it a completeness that sometimes is lacking in so many of our present-day laboratory programs.

When a student has completed an area, he has had an opportunity to get a rather broad general overview of what is included in an industry through his contacts with its materials and products. The pretest, stories, sketches, procedures, investigations, history, construction work, written work, arithmetic, map developments, all help him to get a rather well-rounded and complete contact with the industry involved. Besides this the teacher has available a rather complete composite of what the pupil has accomplished, and what is more, the students' achievement record is in a form that makes an evaluation by teacher, supervisor, or a parent an easy matter.

SHOP

(By an instructor)

Quite a departure from drab bookish modes,
And ritualized theory and text;
Which often leads nabobs of learning to scoff:
"How cunning!" — "Absurd," and "What next?"

A novelty this, in the annals of school;
Sans precedent, prestige and fame;
But I'll wager you odds that in destiny's day
It shall bear an illustrious name.

"A frill and a fad," so the "die-hards" insist;
With a sniff of disdain and a smirk —
Indeed! And is youth to be counseled by those
Who decry the proud virtues of work?

Prate if you must of your cultural light
And much vaunted intellectual trends —
But mark you and well, of the comforting glow;
That the beacon of industry lends.

The arts and the crafts are the birthright of youth;
To cherish, promote and command —
Let worth be the measure and time be the judge:
Of that which is wrought by his hand.

Adam N. Reiter

"I have never seen the advantage of teaching children how to live without teaching them how to make a living." — *John Callahan.*

Pupil Personal-Rating Report Card

RALPH B. LEASURE

Director Industrial Arts,
East Washington High School,
Washington, Pennsylvania

More and more the school authorities and teachers are recognizing that the pupil report cards, which are at present sent home to the parents, are inadequate. Not only are the report cards in general inadequate but especially those used in vocational-education, industrial-arts, and home-economics departments. The report which is most universally used in the schools states only absence, conduct, and rating of the student — which really does not tell the parent very much.

A *report* should, after all, be a personal rating. It should consist of a list of personal factors of the pupil, and a *grade* should be a summation or culmination of these personal factors. For example, a pupil takes home a well-constructed, well-finished end table which he has made. Later he takes home his report with a grade of *C*. His parents and friends, who are judging by the finished project only, believe that the boy deserves a grade of *A*. In this type of report card the grade of C is not very enlightening because it does not reveal how the instructor has had to work with the pupil to sustain enough interest and workmanship to get the project finished. How can a student who is indifferent, inaccurate, careless, noncooperative, and so forth, ever expect to make a high grade? If the report (his personal rating card) shows that John is *Unsatisfactory* in interest, or is *Very Unsatisfactory* in cooperation, then the parents know exactly where the fault is with the child if he has received a low grade. And with this personal-rating report the teacher and the parents are able to get together to help correct these faults.

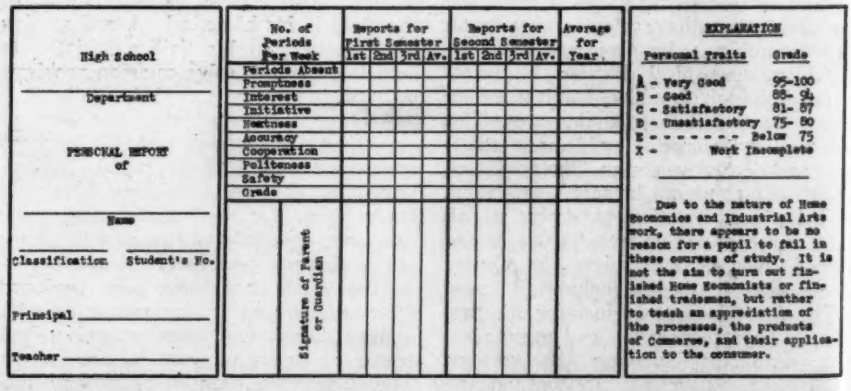
It should be remembered that personal-rating cards are increasingly used in industry. Many industries keep on file a personal-rating card for each employee. This rating card has listed on it: appreciation, interest, health, cooperation, and the like. If the industries expect these qualities in their employees, it is natural to assume that the employees should be taught these traits in school. Personal traits, then, as well as workmanship, should be stressed and graded in the schools, especially in vocational education, industrial arts, and home economics. It is just as important to strive for a higher degree of interest, cooperation, appreciation, safety, promptness, and the like, as it is to strive for increased text knowledge, or a higher standard of workmanship.

The standards by which the pupils are rated should be clear cut and well defined, so that the pupils themselves are able to understand how they are being judged. A prepared sheet with clear definitions of each personal trait, such as is illustrated herewith, will be found very satisfactory. From it, a pupil can see for himself just how he rates in comparison with others in his class, and the individual can take steps to eradicate his weaknesses.

EXPLANATION OF PERSONAL RATING CARD

	Very Unsatisfactory	Unsatisfactory	Satisfactory	Good	Very Good
PROMPTNESS	Habitually late to class. Has to be told to start working.	Usually late to class.	Generally on time.	Can be relied upon to be on time.	Always on time. Starts work immediately upon entering shop.
INTEREST	Indifferent at work. Wastes time. Continually talking to others.	Consistently takes things easy. Occasionally misses class without adequate reason.	Works steadily. Tries to do a fair piece of work.	Willing worker. Persistent on learning the required steps and methods.	Unusually willing worker. Does more than the required work. Always on the alert.
INITIATIVE	Waits to be directed on every step. Always avoids jobs which require a lot of time and energy.	Makes some attempt to go ahead on his own but is easily discouraged. Hesitates to tackle difficult jobs.	Found among those who start things. Requires help on the more difficult jobs.	Sticks to his work and usually sees a job through regardless of its difficulty.	Thinks the job through. Checks his own ideas with those of the instructor. Is a self-starter. Stays with the job.
NEATNESS	Careless. Any kind of rough job will do. Tools and materials thrown around in a disorderly fashion.	Usually careless about work, tools, and materials.	Maintains a fair degree of neatness in regard to the job, tools, and materials.	Usually careful about his work. Likes work to be neat. Keeps orderly workbench.	High sense of appreciation for uniformity. Tools, materials, and waste materials in good order at all times.
ACCURACY	Work is very inaccurate	Errors rather frequent. Careless worker.	Work is usually correct.	Work is consistently accurate.	Extremely accurate. Rarely makes a mistake.
COOPERATION	Unwilling to assist others or the instructor in those things which are for the best interests of the shop.	Seldom willing to work with and assist others.	Generally willing to assist.	Dependable	Unusually willing to help where needed regardless of whether work is disagreeable or not.
POLITENESS	Makes unkind remarks about fellow workmen. Talks to comrades in undertone when instructor is giving demonstration or lecture.	Creates some unfavorable impressions.	Agreeable.	Interesting and likable. Creates a good impression.	Has a high regard for the feelings of others. Creates unusually fine impression.
SAFETY	A hazard to himself and others.	Takes chances affecting himself and others.	Usually works safely.	Works safely and promotes safe practices.	Unusually careful to promote safe practices for himself and others.
GRADE	Poor workmanship.	Fair workmanship.	Average workmanship.	High order of workmanship.	Outstanding workmanship.

Rating scale


High School
Department
PERSONAL REPORT of
Name
Classification
Student's No.
Principal
Teacher
No. of Periods Per Week
Reports for First Semester
Reports for Second Semester
Average for Year
1st 2nd 3rd Av.
Periods Absent
Promptness
Interest
Initiative
Neatness
Accuracy
Cooperation
Politeness
Safety
Grade
Signature of Parent or Guardian
EXPLANATION
Personal Traits
Grade
A - Very Good 95-100
B - Good 88- 94
C - Satisfactory 81- 87
D - Unsatisfactory 75- 80
E - - - - - - - Below 75
X - Work Incomplete
Due to the nature of Home Economics and Industrial Arts work, there appears to be no reason for a pupil to fail in these courses of study. It is not the aim to turn out finished Home Economists or finished tradesmen, but rather to teach an appreciation of the processes, the products of Commerce, and their application to the consumer.

Front, center, and back of a report card. Original is printed on a 7½ by 5½ inch card

Projected Aids in Industrial Arts and Vocational Education

W. R. CLEVELAND

Director of Visual Education,
Downers Grove Community High School,
Downers Grove, Illinois

The use of visual aids is not new to the industrial-arts teacher. He has used to some extent one or more of the following visual aids: demonstrations, visits to industrial concerns, school museums, exhibits, models, charts, displays, drawings, and pictures. Many of these aids have been inherent with the best methods of teaching shop subjects.

Within recent years, along with the introduction of the motion picture into the classroom, there has been much said and written about the projected visual aids. A survey of current practices in visual and auditory instruction in 82 secondary schools from 16 states conducted by the Judd Club of Chicago, revealed that industrial-arts teachers ranked third, both in the frequency of use of visual materials and equipment, and in the effectiveness with which these materials were used. Incidently, science and social science ranked first and second respectively in both use and effectiveness. Since this study deals chiefly with the projected visual aids, it reveals that industrial-arts teachers have been quick to accept this newer type of visual aid even though in many cases it has been hard to find a suitable place for the showing of pictures.

The effectiveness of the educational motion picture is also revealed in the report of Arnold W. Reitze in the article entitled "Effectiveness of Educational Motion Pictures" in the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION MAGAZINE, April, 1939. He points out that his study showed that vocational and prevocational pupils comprehend more from motion pictures than do other groups of pupils. He concludes that "These facts indicate definitely the need and practicability of using more educational films with prevocational and vocational groups."

In using motion pictures or any of the other projected aids there are several rules which must be observed if the aids are to be effective. Some of these rules are: (1) Pupils should be prepared for the pictures they are to see. This means that the teacher should preview the pictures or secure some advance information as to their purpose and content. Study guides can be secured in advance for many films. (2) Pupils should be expected to get something of educational value from the picture. They should take notes and be tested as they would on a demonstration or lecture. (3) Pupils should be expected to maintain the classroom attitude. So, frequently, when pictures are used in school, pupils have the attitude that they are having a "show" and act accordingly. (4) Do not try to show too many pictures at one time. It is better to show a film or set of pictures through once without stopping; then, after some discussion, repeat the showing, stopping at points where additional explanation is needed. Other rules and useful suggestions for using visual aids may be found in many of the references listed at the end of this article. If visual aids are presented in accordance with these suggestions, they are not used to replace the teacher but as another tool for his use.

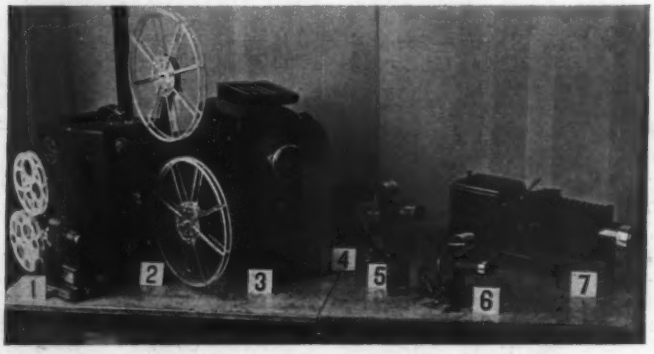
Motion Pictures

Through the motion picture the teacher can bring the factory, the steel mill, or the big construction job, such as the building of Norris Dam, right into the classroom. Also, during a brief interval of time, events can be shown which in reality cover months or even years. Furthermore, events happening in different parts of the world are brought together in one film. Slow-motion and high-speed photography make possible observations otherwise unobservable, while through animation, explanations can be presented more efficiently and effectively than by any other method. Some of the shop demonstrations can be presented to greater advantage through a motion picture made by the teacher because such a picture permits each pupil to observe the demonstration from the best viewpoint, through the eyes of the camera. Lettering can be taught to a greater number of students at one time with the use of the sound motion picture. This is being done successfully at one of the universities in the Middle West. There are unlimited advantages in the use of motion pictures, and although some industrial-arts teachers have started to make their own pictures, there is a need for more teaching films in industrial arts.

Many industrial and commercial firms have produced 16mm. films which are available for school use. Some of them are excellent films containing very little advertising. Some films have been produced by the film companies for teaching purposes, other films have been produced by industrial-arts teachers for use in the classroom.

A list of films produced by industrial concerns may be found in INDUSTRIAL ARTS AND VOCATIONAL EDUCATION MAGAZINE, Volume 29, February, 1940, p. 62; and in April, 1940, p. 147. In connection with the foregoing articles, the following should be noted: All General Electric Co. motion-picture films for school shops should be ordered from the nearest distribution point. Address requests to General Electric Co. at all points except Berkeley, Calif., where they are to be addressed to the Department of Visual Instruction, University of California, Berkeley, Calif. The other addresses are: 920 Southwest Sixty Ave., Portland, Ore.; 212 N. Vignes St., Los Angeles, Calif.; 200 S. Main St., Salt Lake City, Utah; 650 Seventeenth St., Denver, Colo.; 1801 N. Lamar St., Dallas, Tex.; 230 S. Clark St., Chicago, Ill.; 4966 Woodland Ave., Cleveland, Ohio; Visual Instruction Section, 1 River Road, Schenectady, N. Y.; 140 Federal St., Boston, Mass.; 1405 Locust St., Philadelphia, Pa.; and 187 Spring St., N.W., Atlanta, Ga.

The following films are *no longer available:* The Western Electric Co., 195 Broadway, New York City — *Cedar Camps in Cloudland, A Concrete Example,*



1. 16mm silent motion picture projector (400 ft. reel capacity) 2. 16mm silent motion picture projector (1600 ft. reel capacity) 3. Opaque projector. 4. Filmslide projector (single frame only) 5. Memo camera frame) 6. Filmslide projector (single and double frame and miniature glass slide) 7. Lantern slide projector

Enemies of the Southern Pine, From Swamps to Workshops, Oil — the Wood Preserver, and *Trail of the Longleaf Pine.* Curtiss-Wright Corp., Public Relations Dept., 30 Rockefeller Plaza, New York City — *Learning to Fly.* Cleveland Twist Drill Co., Cleveland, Ohio — *Uses and Abuses of Twist Drills.* John Hancock Mutual Life Insurance Co., Boston, Mass. — *Why be Careless?*

Other films which are available are given in the following list:

Backbone of Progress — Sound — 30 min. — $1.50. (Available to schools who are members of this Film Library and by rental rates to other schools in New York State. School pays transportation.) Cooperative Educ. Film Library, School of Education, Syracuse University, Syracuse, N. Y.

California Giants (From Forest to Finished Products) — Sound — 45 min. — Free (only 1 available, in almost constant demand). California Redwood Distrib. Ltd., 35 E. Wacker Drive, Chicago, Ill.

Trees and Men — Sound — 45 min. — Free. Weyerhauser Sales Co., First National Bank Bldg., St. Paul, Minn.

How to Square up Stock — Silent — 15 min. — $1 per day. A. P. Twogood, Iowa State College, Ames, Iowa.

From Tree to Newspaper — Silent — 15 min. — $1. *Iron Ore to Pig Iron* — Silent — 15 min. — $1. *Last of the Wood Engravers* — Silent — 30 min. — $2. *Making an All Steel Automobile Body* — Silent — 30 min. — 70 cents. *Sculpture in Stone* — Silent — 15 min. — $1. *Bicycling with Complete Safety* — Sound — 10 min. — 35 cents. *Land of the Giants* — Sound — 30 min. — $1.05. *Monel Metal* — Sound — 10 min. — 35 cents. *Remember Jimmy* — Sound — 10 min. — 35 cents. University of Iowa, Dept. of Visual Instruction, Iowa City, Iowa.

Facts Behind the News — Sound — 30 min. — Free (prepaid trans.). *Farther, Faster, Safer* — Sound — 30 min. — Free (prepaid trans.). *Under Control* — Sound — 20 min. — Free (prepaid trans.). Pennzoil Co., Oil City, Pa.

Short Course in Paper Making — Sound — 30 min. — Free. P. H. Glatfelter Co., Spring Grove, Pa.

Trip Through the Firestone Factory — Sound — 80 min. — Free. Akin and Bagshaw, 1425 Williams St., Denver, Colo.

Aluminum: Mine to Metal — Sound — 16 min. — Free. *Aluminum Fabricating Processes* — Sound — 16 min. — Free, reserve films in advance. Aluminum Co. of America, Pittsburgh, Pa.

Harvesting the Western Pines — Sound — 30 min. — Free. *Fabricating the Western Pines* — Sound — 35 min. — Free. *Building a Home with Western Pines* — Sound — 25 min. — Free. Western Pine Assn., Yeon Bldg., Portland, Oreg.

Harvesting Uncle Sam's Timber — Silent — 30 min. *How Forests Serve* — Silent — 15 min. *ABC of Forestry* — Sound and Silent — 10 min. *Tree of Life* — Sound — 20 min. For information write U. S. Dept. of Agriculture, Extension Service, Division of Motion Pictures, Washington, D. C.

The Molder — Silent — 15 min. — Free. *Mountains of Copper* — Silent — 15 min. — Free. *The Potters Wheel* — Silent — 15 min. — Free. *Yoke of the Past* — Silent — 45 min. — Free. *Mountains of Copper* — Sound — 10 min. — Free. *Quality Motors in the Making* — Sound — 10 min. — Free. *World of Paper* — Silent — 30 min. — Free. General Electric Co., Visual Instruction Section, Publicity Dept., Schenectady, N. Y.

Books-Manuscript to Classroom — Silent — 15 min. — 50 cents. *Felling Forest Giants* — Silent — 15 min. — $1. *Furniture Making* — Silent — 15 min. — $1. *Gas Engine Four Stroke Cycle* — Silent — 15 min. — $1. *Story of Leather* — Silent — 15 min. — 50 cents. *Limestone and Marble* — Silent — 15 min. — $1. *Making a Book* — Silent — 15 min. — $1. *Tree to Newspaper* — Silent — 15 min. — $1. *Steel-Wire Products* — Silent — 15 min. — 50 cents. *Pig Iron to Steel* — Silent — 15 min. — $1. *Principles of Planning and Constructing Three Small Homes* — Silent — 60 min. — 50 cents. *Rags to Roofs* — Silent — 30 min. — 50 cents. *Sand and Clay* — Silent — 15 min. — $1. *Spare Time* — Silent — 30 min. — 50 cents. *Story of Rubber* — Silent — 15 min. — $1. *Story of a Tire* — Silent — 15 min. — 50 cents. *The Industrial Worker* — Silent — 15 min. — 50 cents. *Driver, Hit and Run* — Sound — 20 min. — $2. *Men and Oil* — Sound — 20 min. — $2.50. *Saving Seconds* — Sound — 10 min. — $1. *Shelter* — Sound — 10 min. — $1.50. University of Illinois, Visual Aids Service, Urbana, Ill. (Lower rental price to schools in Illinois.)

Clay, Hands, and Fire — Sound & Silent — 20 min. — 50 cents. Univ. of Kansas, Bureau of Visual Instruction, Lawrence, Kans.

Harvest of the Years — Sound — 20 min. — Free. *Right Materials in the Right Place* — Sound — 30 min. — 50 cents. *Science Rules the Rouge* — Sound — 20 min. — Free. Iowa State College, Visual Instruction Service, Ames, Iowa.

Welding — Silent — 15 min. — Free. Linde Air Products Co., General Publicity Dept., 30 E. 42nd St., New York, N. Y.

Aluminum: Mine to Metal — Silent — 30 min. — Free. *Copper Mining in Arizona* — Silent — 45 min. — Free. *Evolution of Oil* — 60 min. — Free. *Making a V Type Engine* — Silent — 30 min. — Free. *Nickel* — Silent — 30 min. — Free. *Power Within* — Silent — 30 min. — Free. *Story of Gasoline* — Silent — 30 min. — Free. *Story of Lubricating Oil* — Silent — 30 min. — Free. *Story of a Spark* — Silent — 30 min. — Free. *Story of a Storage Battery* — Silent — 30 min. — Free. *Transportation* — Silent — 30 min. — Free. *Model Metal Working the Ozyacetylene Flame* — Silent — 30 min. — Free. Louis F. Perry, Supv. Engineer, Graphic Section, U. S. Dept. of the Interior, Bureau of Mines, 4800 Forbes Street, Pittsburgh, Pa.

Modern Industrial Methods — Silent — 60 min. — Free. Singer Sewing Machine Co., Adv. Dept., Singer Bldg., New York, N. Y.

Hooping Up — Silent — 15 min. — Free. *In the Wood* — Silent — 15 min. — Free. *Making a Modern Container* — Silent — 15 min. — Free. *March of the Wooden Barrel* — Silent — 15 min. — Free. Associated Cooperage Industries of America, Inc., 411 Olive St., St. Louis, Mo.

Introduction to Mechanical Drawing — Silent — 15 min. — 75 cents. *Lumbering in the Pacific Northwest* — Silent — 15 min. — 75 cents. *Tin* — Silent — 15 min. — 75 cents. *Trees to Tribune* — Sound — 30 min. — 45 cents. Univ. of Wisconsin, Bureau of Visual Instruction, Madison, Wis.

Teaching Lettering by Movies — Sound — 23 min. — $2. *Shop Work* — Silent — 2 reels — $2. Prof. Justus Rising, Purdue University, Lafayette, Ind.

Board Feet or Bored Timber — Silent — 15 min. — Free. *The Drive is On* — Silent — 15 min. — Free. *Fighting Forest Fires* — Silent — 15 min. — Free. *Follow the White Traffic Marker* — Silent — 15 min. — Free. *The Fourth Kingdom* (Bakelite) — Silent — 60 min. — Free. *From Mountain to Cement Sack* — Silent — 15 min. — Free. *House of Dreams* — Silent — 15 min. — Free. *Lumbering in British Columbia* — Silent — 15 min. — Free. *Manufacture of Douglas Fir Plywood* — Silent — 15 min. — Free. *Money Making Industry* — Silent — 15 min. — Free. *New Romance of Glass* — Silent — 30 min. — Free. *Romance of Industry* — Silent — 45 min. — Free. *Big Timber* — Sound — 10 min. — Free. *Colonial Architecture* — Sound — 10 min. — $1.50. *Day with the "Sun"* — Sound — 30 min. — Free. *Fourth Kingdom* (Bakelite) — Sound — 30 min. — Free. *Construction that Endures* — Silent — 15 min. — Free. *Making Paving Brick* — Sound — 10 min. — Free. *Modes and Motors* — Sound — 10 min. — Free. *New Romance of Glass* — Sound — 20 min. — Free. *Once Upon a Time* — Sound — 20 min. — Free. *Pine Ways to Profit* — Sound — 20 min. — Free. *Progress on Parade* — Sound — 30 min. — Free. *We Drivers* — Sound — 10 min. — Free. *Where Mileage Begins* — Sound — 20 min. — Free. Y.M.C.A. Motion Picture Bureau, 19 So. La Salle St., Chicago, Ill.

America Marching On — Silent & Sound — 20 min. — Free. *Men and Machines* — Silent & Sound — 20 min. — Free. *America, Yesterday, Today, and Tomorrow* — Sound — 10 min. — Free. *Frontiers of the Future* — Sound — 10 min. — Free. National Industrial Council, 14 W. 49th St., New York, N. Y.

Bound to Last — Sound — 30 min. — $1.50. *Electricity* — Sound — 12 reels — $1.50 per reel. *Highway Mania* — Sound — 20 min. — $3. *History of Aviation* — Sound — 30 min. — $4.50. *Steel* — Sound — 10 min. — $1.50. *Industries* — Sound — 10 min. — $1.50. Ideal Pictures Corp., 28–34 East 8th St., Chicago, Ill.

The Engineering Profession — Silent — 15 min. — 75 cents. *Making of a Skyscraper* — Silent — 15 min. — 75 cents. *Industrial Worker* — Silent — 15 min. — 75 cents. Mogull Bros., Inc., 68 West 68th St., New York, N. Y.

Many of the films in the foregoing list may also be obtained from one or more of the state university film libraries. There are about forty such libraries in the United States, and possibly the person in your school most interested in visual aids has film catalogs from some of these libraries.

Although the lists just mentioned include one or more films for almost every industrial-arts subject, it does not include every film available for each industrial-arts subject. Several film directories have been prepared which list all the 16mm. educational films available. These are:

1000 and One Film Catalog, 1939–40, 75 cents, by Educational Screen, 64 E. Lake Street, Chicago, Ill.

DeVry Consolidated List of Free Industrial Films, 1939, 50 cents, by DeVry Corporation, 1111 Armitage Avenue, Chicago, Ill.

Directory of 16mm. Film Sources, 1939, 50 cents, by Victor Animatograph Corporation, Davenport, Iowa.

Directory of U. S. Government Films, October, 1939, free, by United States Film Service, Washington, D. C.

Educational Film Catalog, 1939 Edition, $3.00 (with supplements for 1940, $4.00), by H. W. Wilson, 950–72 University Ave., New York, N. Y.

In ordering free films it is necessary to place your order several months in advance, and if the film cannot be secured from one place it may often be secured from another. Most of the worth-while free films can be secured from the state university libraries for a small service fee.

There are two sizes of motion pictures available for school use, one is the 35mm. width and the other the 16mm. The latter size is by far more popular for schools because of the lower cost, both in the projection equipment and the purchase or rental of film. The 16mm. films are usually 400 ft. in length and take from ten to fifteen minutes to show. They are printed on safety stock and may be used without a booth.

At the present time there are more silent 16mm. pictures than sound, but the production of sound educational pictures has become increasingly greater within the last few years. The Eastman Kodak Company, perhaps the greatest producer of silent teaching films, recently announced its first sound projector, and this may be followed by their production of sound films. Incidentally, the newer projectors, both silent and sound, will show 1,600 ft. of pictures without changing reels.

The motion picture has a definite role to play in industrial arts as it does in education in general. It is excellent for depicting continuity of action and unobservable action. However, the motion picture has its limitations, and in some cases the other projected aids are more useful than the motion picture.

Three projected aids commonly used in schools to show still pictures are the filmslide, lantern slide, and the opaque projector. More explanation by the teacher is usually required in using still pictures than in using motion pictures where the action shown in the picture is self-explanatory. However, the still picture may be left on the screen for any necessary length of time. This permits a more thorough discussion of the picture. Furthermore, since the cost of still pictures is much less than that of motion pictures, they may be owned by the school where they can be used at any time. Motion pictures are usually rented and are available for the rental period only (usually one day). Also with the great interest in photography at this time many teachers can make their own still pictures.

The Spencer Lens Co., Buffalo, N. Y., has for free distribution a folder entitled *Sources of Visual Material* which lists sources of supply of filmslides, lantern slides, and pictures for the opaque projector. One or more of the three still projectors will prove valuable to the industrial-arts teacher.

Filmslides

The filmslide, sometimes called the film strip or the picturol, is a series of pictures on 35mm. film. Single rolls contain from twenty to one hundred frames (pictures, charts, diagrams, or notes) with explanation of the picture either on the film or in a teacher's guide which accompanies the filmslide. The filmslide requires very little room for storage, it will not break easily, and its original cost is relatively low ($1.50 to $2 per roll). Some of the filmslides, produced for school use by commercial concerns, which may prove valuable for industrial arts are listed below:

Filmslide projectors, Memo camera and filmslides (left) single and double frame and miniature slides (2 in. by 2 in.) projector (right) single frame projector

Filmslides

Automotive Construction and Operation — 14 rolls, $18 set or $1.50 ea. *How Things are Made* — 1 roll — $1.50. *Lumbering* — 1 roll — $1.50. *Manufacture of Paper* — 1 roll — $1.50. *Trip Through a Paper Mill* — 1 roll — $1.50. *Story of Copper* — 1 roll — $1.50. Dewey and Dewey, 1 Main St. Racine, Dis.

Aeronautics — 3 rolls — $1.50. *Book Manufacturing* — 1 roll — $1.50. *Iron* — 1 roll — $1.50. *Logging* — 1 roll — $1.50. *Lumber Production* — 1 roll — $1.50. *Paper* — 1 roll — $1.50. *Modern Newspaper* — 1 roll — $1.50. *Petroleum* — 2 rolls — $1.50. *Tire Manufacturing* — 2 rolls — $1.50. *Wood Structure* — 1 roll — $1.50. *Wood Utilization and Conservation* — 1 roll — $1.50. Stillfilm, Inc., 8443 Melrose Ave., Hollywood, Calif.

Aluminum — 1 roll — $2. *Aircraft* — 21 *rolls* — $2 ea. *Copper* — 1 roll — $2. *Diesel Engine* — 10 rolls — $2 ea. *Electricity* — 22 rolls — $2 ea. *Electric Welding* — 9 rolls — $2 ea. — Compl. set of 9 rolls, $17.50. *Forestry* — 14 rolls — $2 ea. *History of Architecture* — 12 rolls — $2 ea. *History of Shelter* — 1 roll — $2. *Iron and Steel* — 1 roll — $2. *Primitive Tools* — 1 roll — $2. *Vocational Guidance* — 42 rolls — $2 ea. Compl. set of 42 rolls. $75. *Lead* — 1 roll — $2. Society for Visual Education, 100 E. Ohio St. Chicago, Ill.

Although there are filmslides on a great many subjects, those which can be used most effectively, are those produced by the teacher himself. A filmslide, *Fundamentals of Mechanical Drawing for Junior High School*, produced by teachers in a school in Iowa, has been used in a number of school systems in the last ten years (see *Industrial Education Magazine*, Vol. XXXI, Jan., 1930, and Vol. XXXII, June, 1932). Several filmslides on auto mechanics have been made by another teacher in Nebraska. The writer has made the following filmslides: *Charts, Graphs, and Diagrams, How to Dimension a Simple Working Drawing*, for use in mechanical drawing; *Types of Houses*, for use in architectural drawing; and *Steps in Printing*, for use in printing. These are cited only as examples of what can be done in making pictures without a great amount of equipment. Although all of the above pictures were single frame 35mm. pictures, similar film strips can be prepared with the more common cameras taking double frame 35mm. pictures and shown in the new type of filmslide projector which will show single frame, or double frame 35mm. film, or miniature, 2 by 2-in. glass slides. The only additional equipment needed would be a portrait or copying lens if close-up pictures are to be taken, or if other pictures or drawings are to be copied. A roll of 36 pictures including cost of negative developing and making a positive print will be about $1.80. If bulk film is used and one does his own developing and printing the cost is about one half this amount.

A unique method of making pictures of diagrams or drawings is to copy them from the blackboard. This not only makes the use of a copying lens unnecessary, but it produces a finished picture which has white lines on a black background instead of the usual black lines on a white background, making it easier to read when projected.

Industrial concerns who for some time have realized the value of the filmslide in their training and advertising programs have now gone a step further by using the sound filmslide. The Ford Motor Company has several of the sound filmslides which would be of value to industrial-arts classes. The subjects: *A Trip Through the River Rouge Plant* and *Farms of the Future* are two such filmslides which can be obtained from Ford dealers who will also be glad to lend their sound filmslide projector for showing them. The Incandescent Lamp Department of the General Electric Company, Schenectady, N. Y., has a sound filmslide entitled: *Pictures Indoors with G. E. Mazda Photo Lamps* which is for loan to schools. This is an excellent treatise on indoor photography.

A national survey made in 1936 revealed

that there was only one filmslide projector to every three lantern slide projectors in use in the schools of the United States. So if the industrial-arts teacher finds no filmslide projector in his school available for projecting still pictures he can probably find a lantern slide projector.

Lantern Slides

The possibilities of preparing pictures for use with a lantern slide are even greater than with the filmslide. Furthermore, the clearness and brilliancy of the projected picture is much better.

Photographic slides can be prepared in a manner similar to the one described for making filmslides. The cost of material is greater — 50 cents per dozen for positive photographic plates and the cost for negative film is about 30 cents for eight pictures. Any picture 2¼ by 3 in. or less can be printed onto positive plates. The Eastman Kodak Company, Rochester, N. Y., will furnish free upon request a booklet entitled *Lantern Slides* which describes how to make photographic slides. One teacher in the Chicago area has prepared for use in architectural drawing classes a great many slides showing types of houses.

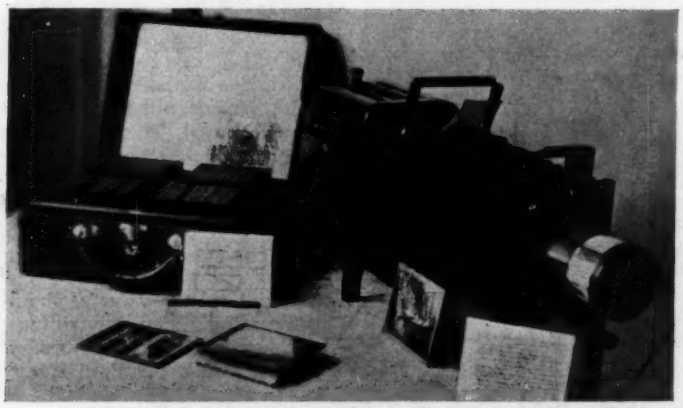
Another way of preparing lantern slides for drawings or freehand sketches is to make the drawing on etched glass ($1.25 per dozen). The drawing can be made with pencil or with special crayons in color (box of six colors 50 cents). The etched glasses can be used over again after washing off the previous drawing. A teacher of mechanical drawing in Cleveland, Ohio, has used this method of making lantern slides very effectively (see *Educational Screen*, Vol. XVIII, Nov., 1939, p. 344) and recommends a cardboard mask be used on the drawing board to hold the etched glass (see *Educational Screen*, Vol. XVIII, May, 1939, p. 172).

A third way of making your own slides is by using cellophane. The drawing or sketch is made on the cellophane with a special pencil, carbon, or India ink, and then the cellophane is placed between a hinged cover glass holder for placing it in the projector. With two of these glass holders any number of cellophane slides can be shown. By using amber cellophane these slides can be shown on the blackboard and the picture is so bright that only ordinary (light material) shades need be drawn. To keep the cellophane slides in the best condition they can be permanently bound between two cover glasses.

The writer uses the cellophane slides in mechanical drawing for problems involving missing lines, missing views, sectional views, and intersections. The slides are prepared by advance students, and when they are projected on the blackboard the missing lines are drawn in with chalk by the students. Any questions arising from the drawing are answered before the next slide is presented. Only a few lines have to be erased before proceeding with the next slide. The slides are arranged according to their degree of difficulty. In the room where this plan has been used, blackboard space is limited, and it would have been impossible for the students to draw more than three of these three view drawings on the blackboard at one time. Furthermore, to illustrate how light the room was, half the students were working on printing while the other half were having the lesson on missing lines.

Several slides for use in teaching proofreading and reading type upside down have been prepared for the printing classes. These slides were made on the proof press using cellophane instead of paper.

No doubt in other lines of industrial arts, the lantern slide can be used with as good results as it has been used for drawing and printing.



Lantern slide projector and slides

The Keystone View Co., Meadville, Pa., has for sale all materials which are needed for making glass slides, and will furnish free upon request a booklet telling how to make slides. The cellophane without carbons costs 75 cents per hundred, while the cover glasses cost $2.50 per hundred, and binding tape costs 20 cents, making the total cost of 100 cellophane slides $5.95.

Several lantern slides have been produced commercially which are suitable for industrial arts. The Keystone View Co. has produced a set of 100 slides for industrial-arts instructors. This set deals chiefly with woodworking. Another set designed by the same company is for use in mechanical and architectural drawing. Although the original cost of commercially made slides is high, many sets can be rented for a small fee. The Iowa State College, Visual Instruction Service, Ames, Iowa, has the following sets for rent:

Development of Printing	30 slides	65c
Lumbering	24 slides	50c
Lumbering in Canada	60 slides	65c
Manufacture of Paper	39 slides	65c
Steel and Steel Products	60 slides	65c
Mechanics	38 slides	65c

Opaque projector

Opaque Projector

The opaque projector will not only show still pictures or photographs, but will show pages from books, newspapers, magazines, maps, charts, or specimens of any kind. All of this may be done with the newer projectors without injury to the material shown. If the material to be shown is larger than 6 in. square, only part of it can be shown at one time. The possibilities for using this type of projector are unlimited. Students giving reports can show illustrations to the class, without having to prepare a slide in advance. Busy teachers can use drawings made by students or found in magazines and show them to the class without any special equipment other than the projector. However, when material is presented the teacher should determine whether it is possible for all the students to see. Frequently printed matter can be read by those near the screen while it is too small to be read by students farther away.

The use of projected aids will vitalize the work in industrial arts and it offers a means of presenting facts and developing attitudes which are in keeping with our modern civilization. If caution is exercised in the selection and use of the projected aids they will improve industrial-arts teaching.

The following is a list of good references on visual education:

Committee on Motion Pictures in Education, *The Motion Picture in Education*, The American Council on Education, Washington, D. C., 1937.

Dale and Ramseyer, *Teaching with Motion Pictures, A Handbook of Administrative Practice*, The American Council on Education, Washington, D. C., 1937.

Dent, Ellsworth, *The Audio-Visual Handbook*, Society for Visual Education, Chicago, Ill., 1937.

Educational Screen Magazines, The Educational Screen, Chicago, Ill.

Hansen, J. E., *Visual Instruction in Our Schools*, Bureau of Visual Instruction, The University of Wisconsin, Madison, Wis. (Free).

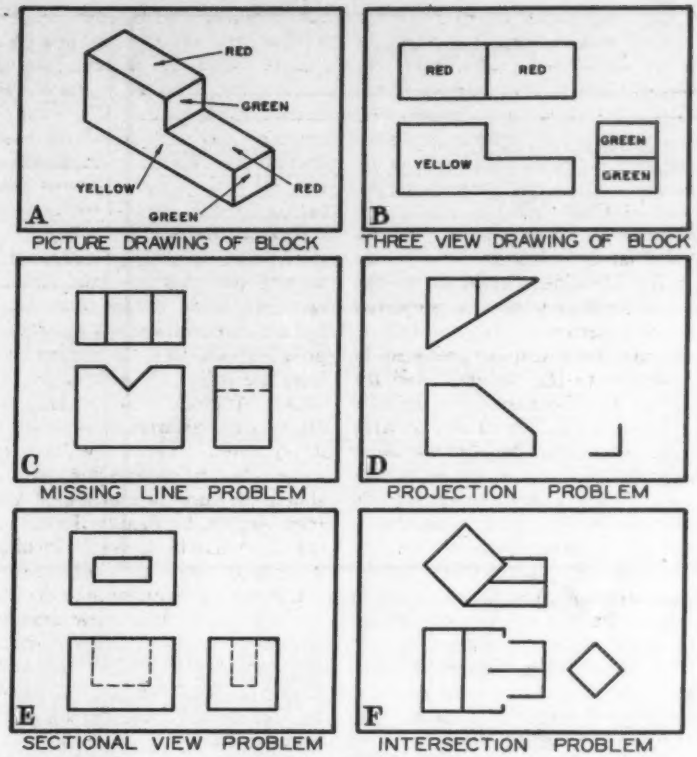
Hoban, Hoban, and Zisman, *Visualizing the Curriculum*, The Cordon Company, New York City, 1937.

Visual Instruction Service, *Suggestions on a School Visual Aids Program*, Iowa State College, Ames, Iowa, 1936. Also *Choosing the Proper Motion Picture Projection Equipment*, and *Choosing Still Picture Projection Equipment* (All Free).

Visual Education Committee of Wisconsin Education Association, *Visual Education*, Wisconsin Education Association, Madison, Wis., 1935 (Free).

Visual Review, Society for Visual Education, Chicago, Ill., 1939 (Free).

Willey, Gilbert S., *The Silent Film as a Teaching Aid*, Akin and Bagshaw, Inc., Denver, Colo. (Free).



Sample slides for use in drawing
A-B — Etched glass slides in color for teaching the relation between picture and orthographic drawing. C, D, E, and F — Cellophane glass slides made with India ink to be projected on blackboard where students add missing lines

Students Plan their Own Projects

G. H. SILVIUS

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The importance of having the student take a more active part in planning the work which he is going to do, is being emphasized by our leaders as a necessary development in the field of industrial education. In the Detroit public schools organized courses of study are used and the aims of each course have been determined and the content of the course has been established in terms of instructional units. The progressive teachers using these organized courses of study, are providing for the individual planning of projects. The purpose of this article is to explain how the student is taught to develop a functional *plan of work* for the job he is going to build in the shop.

"The plan of work that the student is going to develop and work from is made up of a number of parts: "

I. *The Sketch or Drawing:* In many of our shops we have blueprints and drawings of our typical jobs that are available for the students to use at the work station. In this case it is not necessary for the pupil to make a drawing or working sketch of the job unless he plans to alter the design. Several of the craft and scientific magazines contain pictorial drawings of projects that pupils are interested in building. However, it is often necessary to make a working sketch from these drawings because of desirable changes in the design. Then, too, there are students who are interested in making personal jobs. In this case the student is asked to make a rough sketch of the job for a basis of discussion with the teacher in order that the instructor may determine whether the necessary tools and materials are available and whether the job is within the range of the student's abilities.

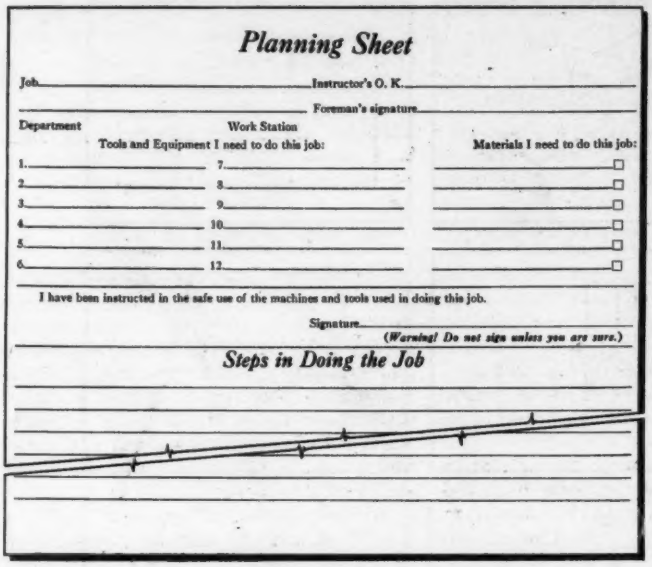
After the teacher has given his approval it will be necessary for the pupil to make a working sketch showing the sizes and shapes of the various parts and how they are assembled. Therefore, it is apparent that the first step in planning a job is to secure or develop a suitable drawing that the worker can follow.

II. *The Bill of Materials:* After studying the drawing or sketch, the student makes out a list of the materials needed to do the job. The stock should be listed according to its size when it is issued to the student. It is important that the complete description of each material be given.

III. *Steps in Doing the Job:* After the student has carefully studied the job he decides on the first thing that must be done. He is asked to describe it in as few words as possible and write it in his plan of work. He then decides on the second thing to be done and writes it in his plan. This procedure is continued until all of the steps have been listed. It seems advisable to use a verb as the first word in the statement. Example:

1. Lay out the stock.
2. Cut out the stock.
3. Plane the surface.

IV. *Determine the Steps to be Inspected and Checked:* The steps in the plan of work are examined and those which describe a layout or measurements should be marked in some acceptable manner. These steps then become foreman or teacher checking levels which help the worker eliminate errors in his work when the step is inspected after it is completed. A plan that works well is to draw a circle around the number of the step to be checked and



Planning Sheet

Job_____ Instructor's O. K._____

Foreman's signature_____

Department Work Station

Tools and Equipment I need to do this job: Materials I need to do this job:

1. 7. ☐
2. 8. ☐
3. 9. ☐
4. 10. ☐
5. 11. ☐
6. 12. ☐

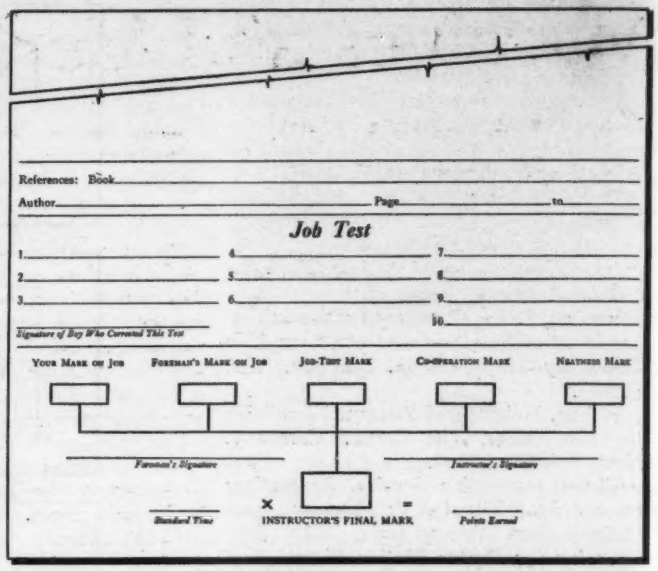
I have been instructed in the safe use of the machines and tools used in doing this job.

Signature_____

(Warning! Do not sign unless you are sure.)

Steps in Doing the Job

Front of Planning Sheet. Original size 8¼ by 10¾ in.



References: Book_____

Author_____ Page_____ to_____

Job Test

1. 4. 7.
2. 5. 8.
3. 6. 9.
10.

Signature of Boy Who Corrected This Test

YOUR MARK ON JOB | FOREMAN'S MARK ON JOB | JOB-TEST MARK | CO-OPERATION MARK | NEATNESS MARK

Foreman's Signature *Instructor's Signature*

Standard Time × INSTRUCTOR'S FINAL MARK = *Points Earned*

Reverse of Planning Sheet

then draw a line from it into the margin. Example:

⑤. Lay out the chamfer.

V. *List the Tools and Equipment:* After the *steps in doing the job* have been listed, the student can then examine each step in the plan of work, and determine the tools and equipment necessary to do that step. When each step has been examined in this manner, all tools and equipment needed to do the job should be listed.

A form sheet is used as an aid to the student in writing his plan of work. These forms are placed in a workbook and sold to the students at the school bookstore. There are enough forms in each workbook to last for one semester. See sample.

Student planning is introduced in the early grade levels of industrial arts by planning the typical jobs together that are going to be built by most of the students in a class. In doing this the class is called together in the planning area; the teacher skillfully directs the discussion; and the job is planned by the group while each student is developing his own plan of work. The job is planned in exactly the same way as it would be if it were being planned by one boy. In this way the students soon learn how to plan a job so they can apply it just as they do any operation. The following operation sheet, "How to Plan a Job,"* has been prepared. It is given to the student as a guide to help him develop a suitable plan of work for the job he has in mind.

Instruction Sheet on How to Plan a Job

I. *Make a Rough Sketch of the Job:* Make a rough sketch on a piece of plain note paper of the job you have selected so that you can discuss it with the teacher. This sketch should show the approximate size of the job and should include a list of the material required.

II. *Have the Teacher Check the Rough Sketch:* After the teacher has checked to determine that the necessary tools and materials are available and that the job is within the range of your abilities, he will give permission to plan the job. If the job consists of a number of pieces that will be assembled, the teacher might suggest that you divide it into its parts and plan each separately. A table lamp might be planned as three jobs: the lamp base, the upright, and the assembling of the lamp. A separate plan of work would be needed for each part.

III. *Make a Finished Sketch of the Job:* A space for making a pencil sketch has been provided in the plan of work. If additional space is needed, attach another piece of paper below the sketching space. Your sketch should show the sizes and shapes of the various parts and how they are assembled. Additional small sketches are helpful in planning some of the details:

1. Select the views.
2. Sketch the views.
3. Dimension the views.
4. Make the necessary notes.

IV. *List the Materials Needed:* Study the sketch and list the material needed. Space for this is provided in the plan of work. In listing lumber, add ½ in. to the finished width and ½ in. to the finished length. Examples:

Gumwood.....1" x 2½" x 4½" — S_2S
6 Wood screws.....¾" — No. 10 F.H.B.
½ Sheet — sandpaper No. ½
Galvanized iron — 28 Gauge — 4" x 4"
Shellac
Red Enamel

It is important that the complete description of each material be given.

V. *Plan the Steps for Doing the Job:* Study the job carefully and pick out the first thing that must be done. Describe this step in as few words as possible and letter it in the plan of work. Use a verb as the first word of the statement. Letter the second thing to be done in the same manner. Continue this procedure until all of the steps have been listed. The plans of work that we have done together will serve as examples and make the procedure of planning the steps clear to you.

VI. *Determine the Steps to be Inspected:* Errors in measurements and layouts result in spoilage of materials and a waste of your time. The steps which describe any layouts of measurements should be indicated on the plan of work. Example:

④. Lay out the fork.

VII. *List the Tools and Equipment:* Examine each step in the plan of work and determine the tools and equipment necessary to do that step. List these in the proper space. Examine each step in this manner. When you have finished, all of the tools and equipment needed to do the job will have been listed.

If a job consists of a number of pieces that will be assembled, the teacher might suggest that the project be divided into its parts and that each part be planned by itself. A separate plan of work is then needed for each item. It often seems difficult for the student to develop a plan of work for a rather large project. For example, a study table could be broken down into its parts; legs, rails, drawer, top, and the assembling and finishing of the table. A separate plan of work would then be made for each part. This practice is followed in manufacturing an automobile. Each piece is planned and made independently before it is assembled.

As the students become familiar with how to plan a job, the entire plan can then be placed on an individual basis. In the higher grade levels of industrial arts, the students can see that a considerable amount of time is saved when jobs are carefully planned before they are built.

For further study of student activity in planning work, your attention is called to: Chapter V, "Principles of Trade and Industrial Teaching," Selvidge and Fryklund, Manual Arts Press. Peoria. Ill.

"Blessed is the teacher who does not lecture but talks, illustrates, demonstrates, shows, holds discussions, asks questions, and invites questions, for his students will learn to think and to do." — *Dr. C. A. Prosser.*

*This is a digest of material appearing in "The Student Planning Book for Industrial Arts" by G. H. Silvius, G. Baysinger and E. L. Bedell, International Textbook Co.

Machines and Men

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A Mechanical Age

The rapid transition in present-day world affairs prompts some reflection upon the trend of human philosophy which has been shaping the thoughts and acts of men. Some would have us believe that the world has become so mechanized that philosophy is no longer necessary to well-ordered living, and that the necessity for thinking is rapidly declining. Even in an age when men's ingenuity has made it possible to accomplish many things mechanically which formerly were unattainable or performed with extreme difficulty, there still remains the necessity for the exercise of human powers if past accomplishments are to be perpetuated in permanent benefits.

In America there is forced very vividly upon us the realization that somehow or other we had come to think that the process of mechanization had become so complete, that even our nation was connected with some sort of perpetual-motion device, or set of automatic controls, which would keep it running indefinitely without interruption or attention. We are now facing the fact that we have neglected the upkeep; we have failed to watch for signs of deterioration, and to provide defenses against it.

The automobile is a highly complicated machine, but in its external forms it is rather common to the experience of the average American. The person who has just come into possession of a glistening new car, fresh from the factory, delights in its beauty, its speed, its response to his touch, and in the admiring remarks of his friends. But if this delight is to be anything more than a fleeting thrill, the body surface must be kept washed, polished, and preserved; every bearing must be kept lubricated; the battery must be checked frequently and supplied with water; there must always be fuel in the gas tank; the cooling system must be kept clean and filled; the tires must be kept inflated to the proper pressure; all fastening devices must be kept tight; every bit of mechanical and electrical equipment must be kept adjusted and in good repair; and even the upholstering must be guarded from destruction by moths who would attack it from within.

Compared with the automobile of forty years ago, the one of today is a masterpiece of mechanical perfection. This very progress and the degree of perfection which has been reached are the very factors which have led to the false impression that it needs less human attention. Even more in the affairs of the nation, industrial advancement, scientific development, and technical progress have created an unfounded sense of trust in material things unaccompanied by constant human vigilance.

Cause and Effect

Before machines became so extensively used for other purposes they were rather well perfected and widely used for keeping time. Perhaps the clock or watch had not been thought of as a machine; but, if so, it is like some of the other indispensable necessities of life — used frequently with little thought as to its nature or its value.

Did you ever stand before a stately clock, with its pendulum swinging back and forth, and ponder upon what it has to do with the affairs of men? First of all the pendulum swinging there does so because of a law of nature, which lay unused for centuries until a man discovered how to put it to work. Then he coupled his knowledge of that law with another invariable one which determines the speed at which wheels will move by the relationship of their circumferences. It remained then only to make use of the force of the steel spring or other driving power to produce the desired result which was an accurate accounting of time.

Even man himself has been depicted as a machine, and in some ways there are striking likenesses. The movement of the various members of the body is mechanical; the operation of the bodily functions is largely chemical; the transformation of food into energy constitutes a source of power; with certain adjustments he is capable of a considerable amount of diversity; he constantly wears out with use, but has the capacity for re-creation more effectively, and over a longer period of time, than the inanimate machine. This power to renew or perpetuate the physical being, however, would be of little avail except for the accomplishment of higher purposes.

In a sense the provision of material necessities and the preservation of physical well-being may be thought of as causes, and the building of noble life and character as the product or the result. Similarly, the building of a machine brings together the raw materials and the laws of nature as the fundamental causes of an end to be accomplished, but the effect is the service which the machine performs.

The clock when devised, assembled, and set going by man is ready to be of service, but it is of little good in the life of man if it is not heeded. It may be used to time a race, a school session, a religious service, a day's work, the departure of a train, or an aerial attack. Obviously, man has it within his power to utilize this one of his machines, and most of the others, toward good ends or ill as promoted by his own motives. If properly utilized, his own mechanical powers, and the machines which he devises can contribute, not alone to his animal powers, but to the improvement of his total estate.

Lessons in Control

The mistaken conclusion is too frequently drawn that the purpose of a machine is to set man free from labor in order that he may enjoy perfect leisure, which in some minds is synonomous with doing nothing. Rather, machines and men may work together, with the machines being utilized to perform their functions so men will be left free to do the things that only men can do and machines cannot.

Machines have no power to think, to love, to imagine, but can do only those things which their makers devise. If the machine is to do its part well, it must be controlled, and in these controls a good deal of human interest may be exhibited. The enormous power shovel or hoisting crane, operated and controlled by a lone man, holds the interest and attention of scores of other people for hours at a time. Apparently they are held by the accomplishments of this great creature under man's control.

In the attempt to duplicate such a life situation, great machines are duplicated in miniature form and sold as toys. For the very young their mere operation continues to be attractive for a considerable period of time, but interest usually declines with continued use. Many a boy, and his father too, has been thrilled with the possession of a new electric-toy train, but the thrill soon fades if the prearrangement was so complete as to require only starting, stopping, and reversing the motion of the train by means of the switch. Building and rebuilding the track, and introducing other construction problems seem to introduce new interest which may involve a more complete feeling of control over the entire device. In this observation, there is an element which should be taken into account by teachers, parents, and others having to do with the training of boys and girls.

As our conception of human values becomes more seasoned, we shall be able to see more clearly the truly desirable relationship between machines and men. Machines will be utilized not to deprive men of work, but to open avenues to new kinds of work; not to destroy men, but to protect them; not to make them sluggish dullards steeped in idleness, but to help them learn new ways of recreation and happiness; not to accentuate the control of man over man, but through the control of man over machines to teach every man better control of himself. This sort of control is the safest and soundest kind that can be woven into the life of any nation.

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

THE SCHOOL SHOP AND THE NATIONAL DEFENSE PROGRAM

The National Defense Program with its many implications presents numerous problems that clamor for solution. Prominent among these is how to train quickly a huge army of unskilled, semiskilled, and workers who at one time were skilled, so that they may satisfy the needs of an industry which is entering upon the task of providing what is required to make America safe for its people.

It is quite evident, right from the start, that no matter how carefully and scientifically the training programs may be drawn up, there can be no all-round mechanics produced in a few months. This, however, need not cause any great concern. There are still thousands of skilled workers who, unfortunately, have not returned to their own trade. Some of these, with a little practice training, can shortly be brought back to their former dexterity with tools and machines. In the meantime, thousands of young workers who have already been or shortly will be inducted into training are subjected to an intensive program which will help them acquire certain specific skills and which will enable them to be extremely valuable helpers to the skilled men already on the job in the production field. Some of these intensively trained workers may even be able to go ahead quite independently as machine operators capable of doing acceptable, accurate work under the supervision of the more skilled all-round mechanics.

In some cases, after these hurriedly trained workers are on the job, it may be found necessary to give them further training during out-of-work hours, in order to help them qualify for some of the more exacting tasks required by the defense program. This development, however, may be left to the future.

The main thing at present is that the training problem is viewed from the right angle. Skilled mechanics are needed, but not all of them must be highly skilled all-round mechanics from the very start. There is a definite need for thousands of workers of the semiskilled type, and these can be trained, if subjected to the proper type of program, in a comparatively short time.

The question of where these men should receive their training is not difficult to answer either. There are many colleges, technical high schools, and part-time and full-time vocational schools that have successfully trained thousands of skilled workers in the past. Unfortunately, some of their late graduates have never had a chance to enter the occupations for which they so hopefully prepared themselves. These schools are equipped with shops, tools, and power machines where the basic skills required by workers in industry may be attained. Further, these shops are in the hands of skilled men who cannot only do, but can teach others what to do.

To equip special training centers when the schools are already outfitted to do the job would be folly. Shop teachers, who know educational procedures, are ready and they can be put on the job immediately. That this is true is shown by the training programs which have already been launched by many school systems. It may be necessary to mention but a few to show how capably and willingly educators can adapt their school shops and methods to the needs of the hour.

At Chicago, for instance, the vocational education program for National Defense makes use of the large shops in the Lane, Tilden, and Crane Technical High Schools and in the Washburne Trade School to train large numbers of WPA workers and NYA students in machine-shop practice and allied trades. One shift runs from 8 a.m. until 2:30 p.m., and another from 3 until 9:30 p.m. A very thorough system of recording and grading has been worked out so that the school has on hand a complete picture of the progress and capabilities of each trainee. This makes it easy to pick the right man for the right job as industry calls for workers.

At the Milwaukee Vocational School three shifts of these trainees are now enrolled. The first group starts in the shop at 7 a.m., and remains there until 12 noon. Then, after a half hour lunch period, the students are given related work from 12:30 to 2:30 p.m. The second group is scheduled for the related work from 9:30 to 11:30 a.m., and then spends from 12 to 5 p.m. in the shop. The third group has its related work from 2:30 to 4:30 p.m. and occupies the shop from 5 until 10 p.m. If need be, a fourth group can be started to run until 3 a.m.

At this school approximately 900 men, women, and youths are being trained at present. They are enrolled in the following subjects: auto servicing, commercial work (comptometer, machine accounting, office appliances), Diesel engines, foundry, machine shop, metallurgy, patternmaking, power sewing, sheet-metal work, and welding (gas and electric).

Other school systems are seriously studying their programs, equipments, and facilities, in an effort to produce a workable plan whereby they, too, can do their part in offering a worthwhile vocational education program for National Defense requirements. Educators in the field of industrial arts and vocational education have seen the need and recognized the service they can render. They are anxious and ready to do their part.

THE ULTIMATE OBJECTIVE OF VOCATIONAL EDUCATION

After the student has finished his courses and has finally received his diploma, there is still a very important thing missing, and that is the job which gives him the opportunity to apply the skills and knowledges that he has acquired.

To get that job means that the boy must turn himself into a salesman for the time being, and sell himself to an employer. This phase, so often overlooked by the vocational teacher, means so much to the beginner, and it is as necessary for him to be instructed in the proper procedures for getting the job, as it is for him to acquire the skills and technical and related information needed when the job has been obtained.

It is necessary then, that the vocational teacher plan special lessons which emphasize the "how, where, and what" to apply for; help the boy prepare himself so that he may make the right kind of an impression; help him overcome his diffidence; coach him on the proper way of making his preliminary statements to the information clerk; provide opportunities for the practicing of answers which he will have to give while being interviewed, or in filling out application blanks; and drill him on the types of questions which he may have to ask, and show him how these questions can be respectfully framed.

Students frequently have the idea that all that is needed to obtain a job is to have a letter of introduction from some person who, to them, seems influential. There is nothing quite so disconcerting to a young, nervous lad as to find a hard-boiled employment man who reads the letter of introduction over with a bored expression, fixes a baleful eye upon the youngster and blasts him with a noncommittal "Well!" Forewarned is forearmed and the teacher must do the forewarning.

Then the questions of "where" often troubles the youthful job hunter. He must be assisted in making up his list, and he must be shown how to find out whom to contact at each of the places where he is to apply. He must be trained to keep a record of his calls at the various plants, stating date and time, and he must be taught how to leave an opening for a return call.

It should be impressed upon him that he must not put too much trust in the statement given so glibly by employment men, "We'll let you know when we can put you on." He must be instructed to follow up his applications regularly and he must know who to ask for at these subsequent visits. This part of the job-seeking technique will be especially hard on the inexperienced, timid boy, and the teacher must help him bolster up his will to undergo the ordeal and to make a good impression on the first call.

Then the student must be thoroughly sold on the trade or occupation for which he was trained in school. He must feel that the time and energy that he has spent in acquiring his vocational education possesses value and that it should not be lightly cast aside. At present it is an easy matter to find college graduates, and students who have finished technical-trade courses, serving as parking-station attendants, clerks in grocery stores and food markets, house-to-house salesmen, and in many other occupations for which they have had no particular training, but which they entered because chance threw the opportunity their way.

It speaks well for these men that they chose to do any kind of work rather than idly wasting their time, but unless they possess a real appreciation of what their vocational training has given them, they will join that great army of vocational drifters who pass from one type of occupation to another without ever having the feeling that they are members of a definite trade or profession.

To impress upon the student the knowledge of how to go about getting a job in the vocation for which he has been trained ought, therefore, be a part of every vocational course. To have the effect which this instruction deserves, it must be well planned and dynamically presented. Too many vocational teachers have neglected to give much consideration to this phase of their work. With a little planning it may still be placed on their outline of instruction.

CHARACTER AND VOCATIONAL TRAINING

In a recent survey made by the Investors Syndicate of Minneapolis, character is rated very high by employers as a job qualification. As a matter of fact, 82.73 per cent of 330 replies emphasize it by such comments as "excellent character, of course, comes before all other qualities."

Scholarship, as a job qualification, received mention in this study in 75.5 per cent of the cases; adaptability, 57 per cent; campus popularity, 32 per cent; personality, 30 per cent; and athletic prowess, 19 per cent. Besides this, it was disclosed that employers are partial to applicants who have worked at some kind of job during summer vacations, rather than spending the time for traveling or making tours. While this survey was made in connection with placement efforts for college graduates, the employment factors established may have equal weight in the placement of the graduates of the secondary-school levels.

At any rate, the information gleaned from the findings of this survey may assist vocational educators in orienting themselves so that they can more efficiently serve the students who attend their classes.

ANALYZING TO SIMPLIFY

With the urgent need of speeding up the production of airplanes at the present time, the Glenn L. Martin Co. at Baltimore, Md., has inaugurated a work simplification program which already has aided the industry to institute many short cuts that save materials and time.

The workers themselves are much interested in these studies because it simplifies their work and helps them produce more units without additional effort on their part. One of these improvements, for instance, saved 900 man-hours on a single contract. Some of the changes effect seemingly infinitesimal savings, yet in the aggregate they mean hours in each working year.

Can this streamlining be applied in the school shop? Some instructors have made material-flow studies in their shops and have found them worth-while. Probably further analysis of the flow of material, the distance traveled to get tools or to make use of machines, and the method of performing operations may be made, thereby shortening the time and reducing the effort for learning the things in school, which must be done at a much increased tempo later on in industry.

THE GRADE-CROSSING MENACE

Statistics show that there were 194 more fatalities and 345 more injuries at railroad-highway grade crossings during the first five months of 1940 than there were during the corresponding months in 1939. They also show that 1,096 of 3,079 collisions between trains and motor vehicles in 1939 were caused by motorists who ran into the side of the train, in some cases when the train was actually standing still. Thirty-three per cent of the 1939 accidents occurred at intersections where the crossings were protected by gates, watchmen, trainmen, or audible or visible signals.

In the three years, 1937, '38, and '39, a total of 16,535 persons were killed or injured at such grade crossings. This is more than 92 per cent of the total recorded railway accidents for that period.

The Bureau of Census of the Department of Commerce reports that motor vehicle fatalities in 145 major cities during the first 25 weeks of this year, show a 7 per cent increase over the same period in 1939.

Further statistics show that 26.4 per cent of all fatal, and 23.1 per cent of all nonfatal accidents are attributable to drivers between the ages of 18 and 24.

Since this age group, 18–24, embraces so many who have just left or are about to leave school, it seems to be highly necessary that safe driving be specially emphasized on the secondary school level. Only by doing this can the grade-crossing and the dare-devil driving menace be allayed.

How to Get a Job in Printing

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Every year thousands of young men leave school to seek work in the publishing and printing professions. Likewise, many now employed seek to better themselves by changing jobs. This article deals with suggestions on how positions are secured, and it is the writer's intent to give examples of specific procedures.

In spite of the years of depression and general unemployment, it is recognized that printing and publishing employers feel a crying need for adequately trained help. During the lean business years following 1929, the printing industry trained few workers, and indentured a decreasing number of apprentices. For several years there was no shortage of help, as industry took up the slack of the unemployed. One authority, writing in a printing trade journal, quoted figures showing that the printing and publishing industries lost 10,000 workers a year through death, retirement, or because of entry into other fields of work. Therefore, because few are now trained under the apprenticeship system, schools of vocational and professional printing are supplying men and women in greater numbers to the printing industries.

Getting a Job

1. *Printing Jobs* are secured by various means:

a) The use of employment bureaus and school employment departments.

b) Answering and placing advertisements.

c) Inquiries about openings by calling at plants.

d) Through contacts.

2. *Placement Services* for school graduates, and for those seeking to better their jobs may be offered by the school from which they were graduated, by printing employer's organizations in the various cities, by general placement bureaus, and by the secretaries of the headquarters of the various unions. The opinion of many, however, is that the applicant should get his job through his own efforts. It is certain that a worker cannot depend wholly upon the agencies just mentioned if he is at all interested in getting an opportunity in the printing industry which will lead him to the top of the profession.

3. *Answering Advertisements* — Help wanted advertisements appear from time to time in daily and weekly newspapers, printers' journals, and publishing journals. Many school graduates and those of considerable experience in the trade secure their positions through these media.

4. *Placing advertisements.* Many workers in all branches of the printing trade, find it profitable to insert situation-wanted advertisements in one or more of the printing journals. Good selection is important, as some magazines cater to the weekly papers and small commercial printing field, while others are read by larger firms in big cities.

5. *Inquiries* about openings, sent after some study of the size and location of the city, and size and kind of plant in which one prefers to work, often result in offers for jobs.

6. *Contacts* with printers, publishers, and organizations, also are helpful. Perhaps one may know the proprietor of a plant personally, or be able to get an introduction to him through a mutual friend. Such organizations as the Craftsmen's Clubs, some of which have "advancing craftsman groups," offer the opportunity to converse with members at monthly meetings, and in that way make their acquaintance. It is easier to apply for a job, or to discover openings, when one is known to the employer or to some other important member of the firm.

7. *Lack of Experience* can be called the strangle hold on the school graduate or apprentice who is looking for a job. Printers, although few of them really adequately train help, look for a source from which they can get experienced workers. A few of them feel that no school can train help correctly or sufficiently. They base their assertions on the following reasons:

a) They have tried out graduates from one or several schools and found them wanting in certain qualifications. Perhaps these young people have not gone to school for a sufficient time to learn the necessary skills, or have been graduated from schools where standards are low. Some students claim to be graduates when they are not, thus adding to the trouble.

b) Few employers are really familiar with the workings of schools, or what the schools are trying to do. Often they cannot differentiate between a junior-high-school printing course and the trade or professional courses. Often having served the old-time apprenticeship, they still believe that the only way to get started on a career in printing is to sweep the floor, deliver packages, melt metal, and distribute type, according to the old type of training.

To combat this opposition, a student or apprentice should avoid applying for a job he knows he cannot hold. He should not claim to be able to perform skills he does not possess. He should admit that he is just starting in the profession, but he should not belittle his training or be modest in stating the duties he can adequately perform. When the subject of school training comes up between prospective employer and employee, the graduate should sell him the idea that schools differ, and prove it by references to catalogs and the amount of work accomplished at various schools.

8. *What to Say* when applying for a job is of great importance. Almost as silly as the man who sticks his head into an employer's office and asks, "You don't need any help today, do you, mister?" is the man who states, when questioned about his abilities, "Oh, I can do *anything*!" The employer takes very little stock in such a bare-faced lie. It is important to tell exactly what you can do. Thus for example:

"I'm best at machine composition, setting about 3,000 ems an hour, but I can also set ads, set job composition, make-ready on platens, and feed jobs to register at 2,000 an hour." Or, "I'd like to work in the layout department, because I excell in this work, but I can also do hand composition of job work, and help out, if needed, in the pressroom and bindery." Or, "I prefer a selling job, because I have been successful at it, but when necessary, I can hand set type, operate a vertical, and . . ."

In large city shops, one may be employed in one department full time, as in the composing room. In country plants, he may be expected to work all around, and perform a dozen duties. One must keep the type of shop in mind when applying for a job.

Speed is an important consideration in mechanical duties. Employers think in terms of time, which is cost to them. They want to know not only what the applicant can *do*, but how *fast* he is, and how *well* the job will be done. They know that a man needs to know how to make adequate, correct layouts, but they are not interested in one who takes a half day to make one for a simple job. They are interested in speed on a linotype — but a string of 3,500 ems an hour is useless to them if a half galley must be reset because of stupid errors. Likewise a man who can feed 2,500 sheets an hour on a platen press is a good worker — provided he has hit the guides. A man, who can make-ready well, but who takes twice as long as the cost book specifies, is of little value on rush work, or, in fact, on any work. In short, an employer wants workers who do not "fiddle around" — who are not too slow.

Loyalty is expected of workers. An employee who takes the interests of the employer to heart is invaluable. Another quality of a good worker is that he comes to work on time — every morning. It is quite aggravating to have men late for work, or have them show up at noon, thus delaying rush jobs. Employers want men who are healthy. They cannot carry a man on the pay roll who is chronically ill. Most employers want men who can suggest time-saving ways of handling jobs, thereby

lowering production costs. Printers are expected to be neat, look well, and not work with a mess of material scattered about them.

All of the foregoing, and more, interest an employer. He wants men who have good qualifications. The applicant who gives the impression of possessing most of the required qualifications stands the best chance of getting a job.

9. *Written Applications* should sell an employer a personal interview. Men hesitate to employ one they have never seen, and never questioned. They like to *size up* an applicant. To get a personal interview, the applicant should write a good letter of application or inquiry. The form of the letter is of great importance. It should be easy to read, as short as possible, and neat. The letter should follow the points listed in the following:

a) Use a good bond of writing paper, 8½ by 11 in. in size. The "Monarch" size, 7¼ by 10½ in. will also do.

b) Letterheads and envelopes should be printed — a printer without stationery is like a cobbler without shoes.

c) Typewrite the letter. If you do not have access to a typewriter, hire the work done. A surprising number of people do not read handwritten letters. Use one side of the sheet only, and double space if the letter is not too long, but do not have more than two pages. About a half dozen paragraphs should suffice. Do not have unsightly errors, strike overs, or smudges.

d) Spelling, paragraphing, word division and punctuation must be of the best.

10. *The Lead Paragraph* — The opening paragraph of the letter of application should be forceful. To say, "I saw your ad and hereby reply" is weak. It's no recommendation to say, "I've been out of work for three months . . ." and borders on the sob stuff, like "I've got to get a job . . . my poor old mother . . ." Hard luck stories are ineffectual, because people have their own troubles to worry about. The fact that you have been out of work for several months may militate against you. A lead such as "I've had no (or little) practical experience, but . . ." is stressing a weak point which should be minimized.

Just as in writing a news item, the lead paragraph of the letter of application must interest the reader and make a favorable impression. Several more forceful leads than the above may be: "I know the work you want done, and that I would make a satisfactory operator is substantiated, I think, in the following outline of my training and experience." "The words 'conscientious and willing to learn' in your recent advertisement for a layout man interested me in applying . . ."

11. *The Body* of the letter of application should not be too long. Printers like brevity. One sheet of typewritten matter should be sufficient space in which to sell the employer a personal interview. Study the advertisement, or if a letter of application is sent to one who has not advertised, keep in mind the type of job you are interested in. It is seldom necessary, in a letter asking for a personal interview, to give the time and place of your birth, your high school, your religion, number of people in your family, or father's business. It is not necessary to include a picture if you can see the man. Play up your good qualifications, and minimize your weak points or lack of long experience. Shorten your statement of what you can do, but be sure to tell the whole story. Saying "I have had courses in the following subjects" means little to the employer, as he has no idea what is taught in courses, regardless of their titles. If you have worked in publishing or printing plants before, merely state what you have done, and for how long a period of time.

12. *The Close* of the letter of application should try to impress upon the employer the need of an interview. To close saying, "I beg to remain," "I request an interview," or "Hoping to hear from you" is not strong enough. It would be better to write "I shall appreciate an interview, at which time you will no doubt want to test my ability in hand composition." Another, "I shall be in Chicago on February 15, and unless I hear from you to the contrary, I shall call at your office." Give your telephone number at the bottom of the letter. Any salary discussion can wait for the personal interview.

13. *The Interview* — When the letter of application has succeeded in selling the employer an interview, bear in mind the following points of conduct:

a) Be on time, if a time has been set. It is preferable to be 5 or 10 minutes ahead of time.

b) When entering the shop office, be courteous to the office girl. Remove your hat, and briefly state your name and reason for calling.

c) When waiting in the outer office, do not sit on the back of your neck in a lazy position, and avoid smoking and scattering ashes over the floor.

d) Be sure to be neat and clean in appearance. Have shined shoes; clean hands, face, and fingernails; a clean shirt, and a good, pressed suit.

e) If the employer extends his hand, take it; otherwise do not offer to shake hands. If you do shake hands, do not present a limp, damp, fishy hand, nor try to impress the man with your great strength, if any, by crushing his hand.

f) Be seated when asked to do so, and do not draw up the chair under the boss's nose so that you blow in his face while you talk. The chair is just where he wants it to be.

g) Let the employer ask questions; do not enter into a long monologue on your abilities.

h) Don't lie about your qualifications; he'll soon find you out if he hires you.

i) Ask for a chance to prove what you can do.

j) Remember that the employer is busy. When he starts to fiddle with things on his desk, and takes very little part in the conversation, saying "yes" and "no" shortly, he is ready to terminate the conversation. Don't stay so long that he is forced to say, "I'm sorry, but I am very busy today." He does not want to say this, but may be forced to, if you don't know when to go.

k) Don't smoke, unless the employer is smoking, and suggests that you do so. Don't garble your voice with a clacking wad of gum — the man may have aversions to both smoking and chewing. If he offers you a smoke, take it if you have the habit.

14. *Conclusions* — Keep in mind that there are ethics in job getting. Don't go after another man's job, and don't attempt to beat down others who are applying for the same job that you are. Employers notice these things and hold them against you. Be sure that your letter of application is flawless — in English, conciseness, correctness, courtesy, and appearance. In an interview, do not try to give the impression that you know it all. Remember that several years in school or at the trade does not make a master printer.

15. *Classified Advertisements* — When inserting advertisements in the situations-wanted columns of the printing and publishing journals, brevity is a money saver. Charges are made per line or per word, with minimum charges. Therefore the more one can pack into an advertisement, the more he gets for his money. When writing the advertisement, consider carefully the job you want, then couch it in the fewest words possible. It is best to give your name and address, seldom the telephone number, unless you are inserting an advertisement in a local journal or newspaper. If you are interested in a certain section of the country, note this, too. Be sure to say the type of work you can do. The same suggestions listed for letters of application apply also to the classified advertisements. Most city public libraries have the important printing journals. Almost all of them have classified-advertising sections, and state the rates and minimum charges.

Three Ways to Prevent Falls

At the National Safety Congress recently held in Atlantic City, Mr. Edward R. Granniss, prominent safety engineer of the National Conservation Bureau, accident-prevention division of the Association of Casualty and Surety Executives, gave three points he considered salient in a program of improvement, as follows:

1. Greater care where older people are concerned which includes reducing their exposure to high places and unsafe surfaces.

2. Correction of physical conditions having elements of hazards, such as faulty flooring, unguarded openings, broken steps, etc.

3. Replacing the "security complex" with an attitude of caution which calls for recognition of possible dangers in situations to which we have become accustomed and about which we are likely to be careless.

What About this Thing Called Guidance!

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When Professor Frank Parsons of Boston died in 1908, he left behind him an almost completed manuscript on "Choosing a Vocation," the first book ever written in this country dealing exclusively with vocational guidance. His book was later published by Meyer Bloomfield, who also is one of the early pioneers in guidance work. This book, and practically all books on guidance down to date, are based upon a kind of Horatio Alger conception of youth. We have assumed, first, that youth could be trained to "choose" a lifetime occupation on the basis of guidance; and second, that anyone trained for a job, and having a degree of ambition to succeed, can do so. All this in the face of a new economic age, with over ten millions of people seeking a means of livelihood, with no frontier to be pioneered, and a world that threatens to brush aside everything that intelligence stands for.

Let us not delude ourselves — boys and girls do not "choose a job," and confer themselves on it. They must be taught to choose a way to live. With half the population of the earth caught in the maelstrom of war, ten years of depression, millions out of employment, a great confusion over issues and values, makes one feel frustrated and uncertain. Our youth face new conditions. Among all the 25,000 and more different types of jobs, with different work patterns, the junior high school with its proposed selective and finding functions, and our outmoded methods of guidance and "choosing a vocation" in the senior high school, offer but a puny armor at best.

Personal defeat and the individual hazard to a secure existence were once due to the individual's weakness, lack of training, defects in person, and so on. These things still function as hazards to be surmounted by youth; but having overcome them is no guarantee against future uncertainty. The youth in our schools have been brought up through our former vocational-guidance plans with the images of money, success, and personal aggrandizement always before them. Our guidance has not had to do with successful living, but with living successfully. Two very different things; one having a broad base, the other a very narrow one.

When last year one of the high schools in this country took for its class motto, even though facetiously, "PWA Here We Come," it offered proof that these are not inviting times for those graduating from our schools and colleges. The very objectives toward which our schools have been working are industrial. It has been the main concern of the schools to provide a training that will fit the student into an industrial society. When suddenly that industrial society breaks down, our school programs are indeed out of joint. Epochal changes are occurring in economic life. These changes have shifted the nature of the school problem from providing workers, to that of providing men — worthy citizens of a great democracy.

Thirty years ago this writer was very enthusiastic about the subject of vocational guidance. It seemed to him then a major objective of all education, and one that could be attained. His book, "The Boy and His Vocation," written about this time and largely used as a reference book where guidance was taught, reflects this attitude. Backed by the finances of the Chamber of Commerce, he directed a vocational survey of the city of St. Paul, Minn. During the years he has collected a library of some seventy books on guidance, and visited schools and observed this work from east to west. This is mentioned by way of justifying the use of the word "enthusiastic" at the beginning of this creed. After thirty years, and seeing hundreds of these students grow up and get on in life, he is far less certain of the value of vocational guidance than he was in those early days of the vocational-guidance era.

Today, the writer does not think a youth should be encouraged to definitely plan, and thus limit his career, because what he will do is not planning, it is a lot of wishful thinking, daydreaming, and has no relation to his ability or the demand for workers in the field of his planning. A youth at eighteen is not the lad he was at eleven, and certainly not at all the man he will be at thirty, forty, or fifty. Life is a succession of advancing stages. For a youth to plan his career and obstinately stick to it would be senseless folly, and to plan it and then cast it aside would show up this "planning" as a purposeless brand of inconsistency. The man he is to be at thirty, forty, or fifty cannot be bounded by a graph made at sixteen. Only folly close to madness would insist that an immature mind of this age should dictate the attitudes and actions of a hardened veteran of decades hence, who, in his clash with circumstances, has found that every aspect of his life has had to undergo some kind of change in the meantime. So far as the writer can determine from his dabblings in the confused history of mankind, not one of the great men of history who have contributed to the welfare of humanity and whose memories we revere in state craft, war, exploration, discovery, science, invention, literature, and art, or in any other field of endeavor, ever had any sort of plan for his career.

There will be 1,750,000 boys and girls leaving our high schools and colleges this June, most of whom will start looking for jobs. Of the 25,000 and more different kinds of work, about 17,000 require abilities and character traits possessed by the average man and woman. These are the common pay jobs. The other 8,000 kinds of jobs can be filled by workers who range above the average in some respects. Outside of this there is the professional work, not classed with those just mentioned. This group constitutes only 5½ per cent of all persons.

The typical boy out of school, if he has not acquired the habit of loafing, will take the first job that he finds to get pocket money for movies, dates, better clothing, and the like. On the average, in the next two years he will hold several, perhaps a good many jobs temporarily. He will drift about until he finds a working level which gives him some degree of satisfaction, or until he has resigned himself to work that may become more or less permanent. Economic conditions and his own ability and disposition are also, of course, factors.

It is during this adjustment period that the part time, the dull season, the evening, and other types of vocational schools will function best for him because of the nearness of the educational need, and the cooperative nature of this type of education with the job at hand.

Out of 7,567 high-school pupils in the Miami, Fla., area, who recently filled out a questionnaire on vocational choice, 1,481 named some type of professional occupation. This is out of all proportion to the number, that in the nature of the occupational demands, can find work in these lines. The writer recalls a similar survey covering three successive years, in which questionnaires were filled out by the students in the high schools of Hibbing, Minn. Over one third of them filled in a different occupational choice each year, and less than one third filled in the same choice on each of the three years. Instruction given on the basis of even such wishful thinking would have been well placed in only one third of the cases.

What about aptitude tests; do they, or can they do better? They cannot, because ability to succeed in an occupation is based on traits that psychology has as yet failed

to measure. They are such things as judgment, a sense of humor, ability to get on with people, poise, dependability, initiative, and so on through a list of character traits that far outrank special skills. These things are the *intangibles of education.* They do not show up in the course of study and yet they are the important by-products of all good education, and are the most lasting results of any type of training.

Vocational guidance along the lines of "guidance, placement, and follow-up" is one of the educational dreams doomed to failure because of the very nature of our human limitations as teachers, and also because the subjects, the students with and upon whom we work, and who cannot be gauged, measured, packaged, and depended upon for uniform results, are also human. We could foretell the time of the recent eclipse of the sun, and all the other eclipses for a thousand years to come, but no wisdom is sufficient to predict even one hour in the life of a boy. And yet the 1917 federal law, the Magna Charta of all such work in the schools, is based upon just such early occupational choice.

Vocational guidance is too restricted a term for use. We must recognize that there are many kinds of guidance, such as educational, moral, health, citizenship, recreational, and the like. Such guidance as we give must be broad and general, dealing with many facets of life. Perhaps we shall find that the term *guidance* alone is sufficient, and that it may be properly considered as one of the social sciences. These are problems yet in the lap of the gods. Certainly guidance in vocational lines only, aimed to stimulate choice, followed by placement and follow-up or even by training in a restricted line at an early age, is not only unworkable, but is socially unsound.

The old trade guilds of the middle ages, and the later system of organized apprenticeship, could do this, but elements and conditions were entirely different. The demand for workers in the various lines was known, and no more young workers were allowed to enter training than could be absorbed in any particular trade.

We shall have to struggle mightily to establish a true basis for this type of guidance in the future life of American youth, but neither our guidance nor our training must be such as to throw society out of its natural balance. We must not forget that no matter how men are trained, the processes of life must go on.

To do this work of guidance correctly then, presents to us a challenge of first importance. Science and culture reveal to man the prospect of a great human relationship. Members of society today are so interdependent that issues are no longer simple, individual, or local, as in the days of the Alger boys. These relationships are complex and world-wide, and they need careful study if we are to properly guide the youth of our country, who fortunately may still dare to plan and dream.

Vitalizing the Pupil-Personnel Organization

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The emphasis now being placed upon the pupil personnel organization in industrial-arts shops has brought forth many schemes. However, one of the most pertinent criticisms of these plans is that in many cases they are merely glorified monitorial systems.

For some time we have had a very definite organization in our industrial-arts auto shop in the senior high school. This organization served to get the necessary things done, relieving the teacher of many routine duties and giving the students an opportunity to assume certain responsibilities and to associate with their fellow workers both as leaders and as followers. There are two methods of selecting students for the positions; (*a*) that the boy who can and does his assigned job well should be kept in that position — a plan similar to that followed in industry; or (*b*) that because we are primarily concerned with education, each boy should have the opportunity and be required to hold each position. After considering the advantages and disadvantages of both systems, it was decided to use the second method. Accordingly, the students were rotated through the different positions alphabetically and at intervals frequent enough to assure each one an opportunity at each position. This is where the monitorial objection enters the picture.

To eliminate this objection the following plan has been worked out and has proved very effective:

1. Each class is acquainted with the personnel organization used in the shop. It is as follows:

General Personnel

Shop Manager: (1) He is the first assistant to the instructor, and is in charge of the personnel organization. (2) He is the host who greets all visitors to the shop and assists them in every way possible. (3) He get reports from the key members of the staff at the close of each period and in turn reports to the instructor.

Assistant Shop Manager: (1) Assists shop manager. (2) Takes shop manager's place in case of the latter's absence.

Safety Engineer: (1) Sees that safety is practiced at all times, such as (*a*) Using tools properly. (*b*) Blocking up equipment. (*c*) Starting motors. (*d*) Handling batteries. (2) Sees that oil and gasoline are properly stored. (3) Sees that oily or gasoline-soaked rags are kept in waste cans at all times. (4) Sees that waste cans are emptied regularly. (5) Sees that exhaust ducts are operating when motors are running.

Special Tool-Cabinet Foreman: (1) Checks equipment in special tool cabinet and in tool kits at the beginning and end of each period. (2) Unlocks and locks cabinets. (3) Repairs, paints, and generally takes care of tools.

Librarian: (1) Checks books and reference material in library at beginning and end of each period. (2) Unlocks and locks library. (3) Sees that reference material is used properly. (4) Keeps all reference material in good shape. Repairs if necessary. (5) Keeps magazine rack in order.

Battery Foreman: (1) Keeps plates covered with distilled water. (2) Puts batteries on charge at beginning of each period. (3) Assigns batteries during period when needed. (4) Takes batteries off charge at end of each period. (5) Checks occasionally with hydrometer and voltmeter.

Locker Foreman: (1) Inspects lockers occasionally to see that coveralls are hung up and that waste material has not accumulated. (2) Sees that locker doors are kept closed, especially at close of period.

Drawing-Equipment Foreman: (1) Sees that drawing boards are used carefully. (2) Stores boards at the end of each period in a neat, orderly manner.

Window Foreman: (1) Opens windows or doors whenever a motor is running. (2) Opens windows when necessary during the summer months. (3) Inspects and locks windows at the end of each period.

Group Personnel

Foreman: (1) Supervises the work of his group. Sees that work goes on in a well-planned and orderly manner, and that all members of the group are kept at work.

(2) Supervises cleanup: (*a*) Get unit into shape to leave. All parts must be in container. (*b*) Gets report from tool checker. (3) Sees that all members of group wear coveralls when doing practical work. (4) *Personally* gets any special tools or equipment and sees that everything is returned in good condition. (5) Reminds group when assignments are due. (6) Collects all papers from group and marks them on the day received. He also indicates whether the papers were handed in on time, or, if late marks upon them how late they were. (7) Carefully checks each paper or contract for neatness, completeness, and quality of work. He also adds comments where necessary.

Assistant Foreman: (1) Assists foreman. (2) Takes foreman's place in case of the latter's absence.

Tool Checker: (1) Checks tool kit at the beginning of each period. Reports if tools are dirty, broken, or missing. (2) Sees that the members of his group use and care for the tools in their kits. (3) Checks tool kit at the end of the period and reports on its condition.

Unit Man: (1) Keeps unit in good order. (2) Prepares unit for leaving at end of each period. Sees that all parts are in container. (3) Keeps unit clean. Cleans drip pan when necessary and sweeps around unit when necessary.

2. The students are asked to carefully consider the different positions and to select the one they are most interested in and believe are best qualified for. They then write a *letter of application* for the position selected.

This procedure does not apply to the group personnel, as each boy in each group will be required to serve in each position during the term.

3. The instructor reviews the letters of application, selecting the best three letters for each position.

It is very important that the students who are not selected be shown why their letters were inferior.

The instructor then conducts a *personal interview* with each applicant for the key position in the shop — shop manager. Such questions are asked of the candidates as:

Why are you interested in this position?

Why do you think you are qualified for this position?

How do you plan to carry out the duties of the position if you are selected?

On the basis of the letters of application and the personal interviews, the shop manager is then appointed by the instructor.

The shop manager selected then interviews the applicants for the remaining positions, and, with the assistance of the instructor, the positions are filled.

Again care must be exercised in explaining to the unsuccessful applicants where they have failed.

4. The successful applicants hold their positions for one report card period. When the averages are computed at the end of this period, the students are given points to be added to their average commensurate with the importance and requirements of their position.

At the beginning of each new report period, the positions are considered open, providing an opportunity for previously unsuccessful applicants to secure a position. However, they must compete against the boys who have been holding the position, if those boys are desirous of continuing.

5. If, in occasional cases, no one applies for a certain position, the instructor selects a boy who, according to his opinion, will do a good job. The boy, of course, may accept or refuse as he desires.

The successful use of this plan requires that it be "sold" to the students. However, once sold it will provide:

1. A most efficient shop organization. The boy who is interested and qualified gets the job and receives valuable experience. Each student has an equal opportunity for each position and a chance to try again if he is not successful the first time.

2. It improves the morale.

3. It furnishes a fine opportunity for giving information on the techniques of job getting, writing letters of application, and how to act when given a personal interview.

Safety Education in the School Shop

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Much has been said about a program of safety education in the school shop, but how to proceed with such a program is a question that puzzles many of us. Should we point out only the dangers that exist and nag our pupils with warning, such as, "Be careful! Don't touch the saw while it is running and don't put your fingers into the cutter of the jointer?" Can we teach safety by frightening the pupils into doing things correctly? No — fear is as undesirable as accidents and should be avoided. The boy who is afraid is tense and is more liable to meet with an accident than is the boy who operates the machine carefully but with confidence.

Man likes to take chances and likes to investigate. He likes to find out for himself. When told not to do this or that because it is certain to cause an accident, there are any number of people who will do just that to see if the accident will really occur. How many people have you seen look at a sign marked, "Wet Paint," and then deliberately touch the painted surface with his finger? Why? They just wanted to find out for themselves. It is not to be assumed that a person should never take a chance, but unnecessary risks are to be avoided especially when nothing is to be gained. In all types of rescue work, it is necessary to take chances, but then there is something worth-while to be gained.

Safety is not learned by memorizing safety codes or slogans. They may have value, however, if they are drafted by the pupils after carefully analyzing the tool or machine, provided a careful check is made to see that the practices coincide with the adopted code. If safety codes are not so handled, then the time spent on them has been wasted.

The students' morale must be built up and a safety consciousness must be developed in them. When the students take pride in the record of "No Accidents in This Shop," and consider that it would be a disgrace, not only to the school but to the individual as well, to have the record broken, then something has been accomplished. When the safety program has been handled in this manner, the instructor has done his bit toward the prevention of accidents, not only in the shop but in the home, on the street, and in industry as well, for then he is sending young people from his shops who are safety conscious.

It may be well to stop a moment to discuss the why of teaching safety in the shop. Is safety taught because the instructor is afraid that a serious accident in his shop would put him on the spot? Does he attempt to teach safety so as to prevent costly lawsuits? Is it because he does not want the school to lose attendance money? Is it because of the effect that a serious injury might have on the future life of one of his pupils? Safety is taught in the school shop because dangers exist there. Each year in the United States nearly 100,000 persons are killed through accidents, and 11,500,000 others meet with disabling injuries. It is the duty of teachers then, to assist in stamping out this unnecessary misery. The aim of every safety program should be to develop safety habits, safety skills, and safety attitudes that will decrease the number of accidents and give the individual freedom from fears and conditions which may restrict his enjoyment of life to the fullest extent.

How can this desired end be accomplished? One thing that must be remembered is that safety education must be

a continuous process. It cannot be completed in a day, a week, or a month. Long drawn out safety lessons are dull and a bore and should be avoided. Probably safety can best be taught through short but frequent and carefully prepared lessons. It cannot be a hit-and-miss proposition nor can it be taught incidently. It must be direct. Each teacher must set up a program that will best fulfill the needs of his individual shop. More important than setting up the program is its execution. It should start with the beginning classes and continue through the advanced classes.

The beginning classes, especially in the elementary and junior high schools, usually use only hand tools. This is the place to start the safety campaign. These pupils should be taught the correct tool procedures so that there is no danger of injury as the result of incorrect usage. Safety instruction must be applied even to such simple operations as the handling of the wood chisel. In a beginning group many pupils attempt to chisel by holding the tool in one hand and placing the other one on the stock in front of the tool. The danger here is so obvious that it is usually necessary to point out the hazard to the pupil but once. The beginner employs similar dangerous practices with the saw, hammer, screw driver, pocketknife, drawknife, carving tools, hatchet, brace and bit, and the like.

The poorly kept shop is overflowing with dangers. Scrap lumber strewn about the floor often is the cause of someone's tripping and falling into a machine, and there is the constant danger of being injured by stepping on a nail. Many accidents are caused by falling objects, and this hazard is increased where overhead racks are used. However, this danger may be eliminated by keeping such racks orderly. Be a good housekeeper. The teacher who has an untidy shop has no alibi when accidents occur.

Power machinery offers the greatest danger in the shop and should be equipped with adequate guards and safety devices at all hazardous points. The use of individual motors has greatly reduced the dangers from belts, pulleys, and shafting. Each shop teacher should secure a copy of the safety code as set up by the department of labor in his state. The Division of Labor Standards of the United States Department of Labor has a "Manual of Information on Safeguarding Hazardous Machinery" that may be had for the asking. The same department has other bulletins that will prove of value to the shop teacher.

Just when the pupils should be permitted to operate the various machines is a problem that must be solved by the individual teacher. This will vary with the size of classes, and the number and type of machines in the shop. Certainly no one should operate any machine until he has seen it in operation and has been thoroughly instructed in its operation. He should know each part of the machine, its purpose and its use. In some shops, the teacher selects one pupil and has him do all of the operating of a given machine, gradually permitting others the privilege as they proved themselves capable. Each new operator should be carefully supervised, either by the teacher or by a student who has previously operated the machine to the satisfaction of the teacher. In some shops safety clubs are organized; others use students as safety engineers to supervise the use of power machinery. Various types of organizations have proved successful, but the success of any of these depends on the teacher.

The wearing of loose clothing and four-in-hand ties while working at power machinery is dangerous. Such ties should be removed at the beginning of the class. Sleeves should be rolled to the elbows.

Where line shafting is used, it should be suspended from the ceiling whenever possible. Belts should be enclosed and belt shifters provided. If it is necessary to place the shafting along the floor, then this section of the shop must be carefully guarded. Pulleys should be enclosed, ends of shafting covered, and hollow setscrews used in all collars. Some type of nonslipping floor covering should be provided about all machines to insure that the operator has a secure footing. The floor around the machines should be kept clean and free from scraps. Lines should be clearly painted on the floor about each machine to indicate the danger zone. Machines, as well as shafting, should be kept properly lubricated and the machines kept in proper adjustment.

The following suggestions might well be incorporated in the safety code of any shop. They should, however, be incorporated only after the pupils and teacher have carefully discussed the hazards that exist, and should not be set up arbitrarily by the teacher.

General

1. No one, except the operator, should be within the danger zone (as marked on the floor) while the machine is being operated.
2. No one should talk to the operator of a machine.
3. Adjustments and repairs should be made only after stopping the machine.
4. An operator should never leave a machine until it has stopped.

Table Saw

1. If you have had no instruction in the operation of the table saw, leave it alone.
2. Use the guards whenever possible.
3. Use the "push sticks" when ripping narrow stock 3 in. or less in width.
4. Stand to one side of the saw and not in a direct line with it.
5. Raise the saw until it just protrudes through the stock.
6. Do not reach over the saw to secure pieces of stock. Walk around.
7. It is absolutely necessary to use the slide rest when crosscutting.
8. Use the ripping guide only when cutting with the grain.
9. Saws should be sharp and properly set.
10. Cracked saw blades should be discarded.

Wood Lathe

1. Place the stock in the lathe securely.
2. Fasten the tailstock securely.
3. Have the tailstock adjustment tight.
4. Rotate the stock by hand before turning on power to see that stock revolves freely.
5. Operate the lathe at the proper speed. Recommended speeds for faceplate turning: under 4 in. diameters high speed; from 4 to 6 in. diameter, use second speed for roughing off and high speed for finishing; for stock with a diameter over 6 in., use low speed for roughing off and second or third speed for finishing.
6. Hold the tools firmly. Know how to use each tool correctly, then use it that way.
7. The tool rest should be slightly above center.
8. The tool rest should be approximately ⅛ in. from the stock.

Jig Saw

1. Have the foot of the guide firmly on the stock.
2. Keep the eyes at a safe distance from the blade. Blades sometimes break in such a manner as to snap a fragment toward the face.
3. Operate the saw at the proper speed for the stock being cut.

Band Saw

1. Have the saw at the proper tension.
2. Have the guide at the correct height. It should be just high enough to clear the work and show the line.
3. The guide jaws should allow the set of the teeth to pass freely.
4. Press stock against the saw no faster than will give an easy cutting movement.
5. Hold the stock firmly.
6. If it should become necessary to back out of the cut, care must be taken that the saw is not pulled from the wheels. Often it is better to cut through the waste stock rather than to back out of the cut.
7. In cutting small circles and sharp curves, a narrow blade should be used. The operator must be careful not to twist the saw.
8. Have a blade of sufficient size for heavy work.
9. The saw should travel slightly ahead of center on the wheels.
10. Both the top and bottom wheels should be completely enclosed.
11. The back edge of the saw blade should run on the guide wheels or rollers. Check to see that these wheels revolve freely.
12. Blades that have been brazed several times should be discarded.

Jointer

1. Avoid using this machine for stock less than fifteen inches in length.
2. Avoid placing the hands on the stock directly above the cutter.
3. Avoid using this machine to surface thin stock. If it should be necessary, then use a *shoe*. A shoe is made from a piece of 2 by 4-in. material and has a thin block securely fastened to the underside. The shoe should be provided with a handle.
4. Provide safety guard over the portion of the cutter not in use.
5. Provide guard over the cutter behind the fence.
6. Squarehead cutters should be replaced with the roundhead type.
7. Be certain that the machine has attained

the necessary speed before using. A slow-moving cutterhead has a tendency to kick the stock.
8. Avoid taking too deep a cut.

Grinder

1. Wear goggles.
2. Keep the fingers off the grinding wheel.
3. Provide metal safety collars on either side of the grinding wheels. There should be some type of a cushion between the collar and the grinding wheel.
4. But one person at a time should use the grinder.
5. Know the use of the grinder and how to keep it in condition. Know the effect that soft metals have on the pours of the grinding wheel.
6. Some shops have special tool grinders, and they should be used only for sharpening tools.

Drill Press

1. Fasten the drill into the chuck securely.
2. Hold the stock firmly.
3. Do not attempt to hold small pieces in the fingers when drilling.
4. Operate the drill press at the proper speed; this depends upon the size of drill being used and the type of material being drilled.

Engine Lathe

1. All gears should be properly covered.
2. Know the various adjustments and uses of the machine.
3. Place the stock securely in the lathe.
4. Know the tool to use for the various types of work.
5. Keep the fingers away from the stock.
6. Operate the lathe at the proper speed for the work being done.

Shaper

1. Operator should wear goggles.
2. Use only such cutters that slip onto the spindle. Avoid the use of the homemade variety that fasten on either side. The shaper travels at an exceeding high rate of speed, and a loose cutter might easily be fatal.
3. Before starting the shaper, be certain that the nut that secures the cutter is tight.
4. Provide a safety guard that protects the hands and fingers from the cutter.
5. The adjustable table should be properly tightened before starting.
6. Keep the cutters sharp.
7. Turn the spindle by hand to see that it operates freely before turning on the power.

Wherever power machines are used, the instructor should check at regular intervals to see that motors are properly lubricated and in good running order. Where line shafting is used, he should be constantly on the lookout for faulty belts, loose pulleys and hangers. All bearings should be kept properly oiled. The wise teacher will constantly have one eye watching for needed repairs and will have all such repairs made at once.

Hand Machines

Hand machines generally do not present the same dangers as do the power machines. There are two, however, that are often found in the school shop that need be handled with care: the squaring shears and the brake. Injuries from these machines are usually from two causes; one is that the boy operates the machines without having his hands in a safe place, the other is that of the playboy who operates the machine each time he passes it and, often another member of the class is adjusting his material in the machine at the time. These machines should be provided with safety guards, especially the squaring shears. In some shops the playboy danger has been eliminated to a large extent by locking the machine when not in use. There is also the danger of stepping on the treadle accidentally, but this can be prevented by placing a block under the treadle that must be removed before the machine can be used.

Electricity

1. Be certain that the insulation on all open wiring is in good condition.
2. All loose wiring that is subject to wear or is in danger of being torn loose should be placed in conduit.
3. Switches should be in good condition. Broken or loose switches should be promptly repaired.
4. Provide a master switch for all power machinery. This should be placed in a box that can be locked.
5. Permit no one to test the current by placing a finger in a socket or across the circuit.
6. Use proper fuses. Never permit pennies or other materials to be substituted for fuses. Keep an ample supply of fuses on hand. If fuses are constantly being blown out don't put in another until the cause is remedied.
7. Teach respect for electricity.
8. Each member of the class should know what to do in case of electric shock.
9. Shut off the current before attempting to remove a person from a live wire. If this is impossible, the rescuer should be properly insulated.

Miscellaneous

In the typical general shop, several units are usually offered that make it necessary that special precaution be taken to avoid not only injury to the individual, but damaging the building as well.

The pouring of hot metal in the foundry unit should be closely supervised and those taking part should be furnished with goggles, leather aprons, leather leggings, and leather gloves. Those not engaged in the pouring should remain at a safe distance. Similar equipment should be provided for those doing forge work. Hot pieces of metal should not be left about unless someone stands by to warn those who would handle such objects

To prevent fires and painful burns, soldering coppers should be placed in a special rack. Each student should be instructed in the use and care of the blowtorch, gasoline fire pot, or other heating devices used. Gasoline should be kept in clearly marked containers, and, if possible, such containers should be placed in another room.

Rags that have become saturated with paint, stain, oil, and the like, always present a serious fire hazard. Such rags should be placed in a metal container until the end of the day when they should be burned.

Conclusion

If an accident occurs the teacher should not pass up the opportunity to demonstrate to the class how it happened, why it happened, and how it could have been prevented. Such demonstrations are very realistic and are not soon forgotten.

Each teacher in preparing his safety program must study his shop and analyze the hazards that are present. He must then determine the most suitable method of overcoming those hazards. In a program of safety education for a school shop it is imperative that the teacher be thoroughly familiar with the proper tool procedures and the proper method of operating the various machines. There is nothing that a pupil notices more quickly or hides behind more readily than the incorrect practices of the teacher.

Every shop should be provided with a suitable first-aid kit. Many such kits are on the market at small cost. However, they often contain many items that are not needed. A satisfactory cabinet might easily be constructed in the shop. The school nurse or a local doctor should then be consulted in regard to equipping it. If the instructor is not familiar with first-aid practices, he should make a study of that subject at once.

All injuries and scratches should be reported to the instructor, no matter how insignificant they might appear. The instructor should see that they are properly treated and should watch them from day to day to see that any infection that might set in does not go unheeded. The school might not be responsible for accidents that occur as the result of carelessness on the part of the pupil, but it certainly should be held liable if proper attention is not given to such injuries.

Exhibit of work done at Sumner High School, Cairo, Ill., L. D. Jenkins, instructor

Students Are Potential Consumers

W. E. GIESE
Lafayette, Indiana

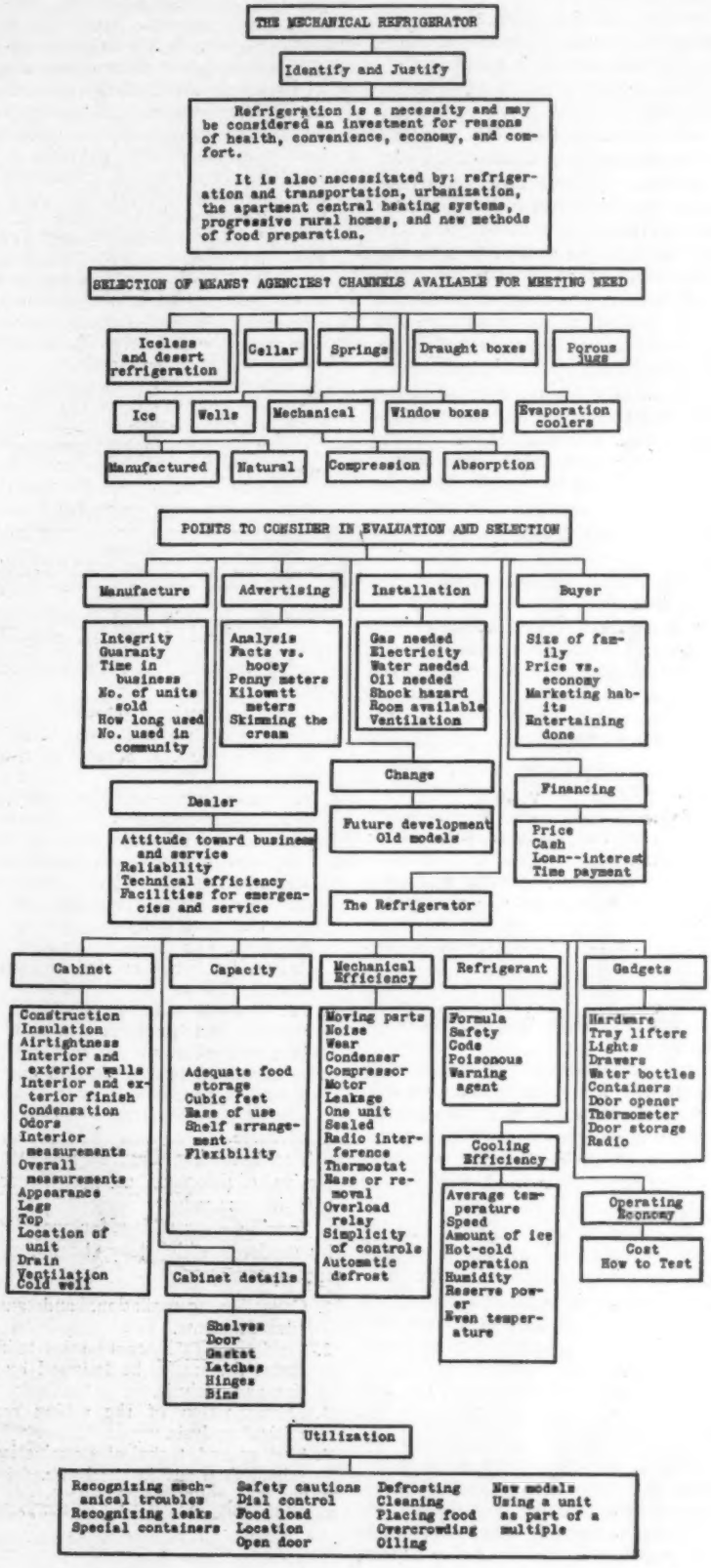
To have an intelligent consumer who understands the closely intertwined relationship of consumer-distributor-producer is important in this industrial age. We cannot continue much longer to progress mechanistically in a narrow search for profit through consumer exploitation; increased consumption and consumer welfare must be the guiding touchstones of future advances, a new frontier for our expanding society. Today one of the least generally understood phases of economics is consumption and consumers. It is the job of the school to make the potential consumer conscious of his purchasing powers and to assist him in clarifying his needs and demands. The formation of the Consumer Education Association last year and the recent institute at Stephans College accentuates this point and indicates that things are being done in this field.

To keep industrial arts and vocational education in a leading and progressive position, the shop instructor must take consumer criteria out of the printed philosophies and statements of objectives and apply them specifically. In the classroom and shop one can provide the opportunities, conditions, plan of operation and patterns, give information, stimulation, supervision, and guidance. The multiplicity of products on the market requires discrimination between brands of the same products and discrimination between goods which satisfy entirely different wants. Students should have developed while in school those powers of self-help which will enable them to intelligently identify, justify, select, and use the things he needs.

This discussion will be divided into two parts; the first pertaining to an analysis of buying, and the second a study of methods that may be used in analyzing the buying situation.

To develop the criteria of self-help in using consumer knowledge leads to a plan of development that may be called "Case Studies of Buying Situations" or "An Analysis of Typical Consumer Episodes." It is to be stressed that the situations must be typical and from life.

The selection of buying episodes for study is best done in terms of frequency, significance, economy, and availability. This paper will consider possibilities of teaching consumer education in the electric shop and the illustrative chart deals with purchasing an electric refrigerator. Though the individual buys a refrigerator infrequently, the significance of the purchase is extremely important because of the initial investment and the fact that the right size must be purchased to acccommodate family needs and habits. The frequency, however, of purchases of refrigerators in one com-



munity may be so large as to attach value to the episode. There is little question as to availability any more and the economy aspect is shown in the accompanying chart.

The buying situation divides itself into the following steps or units:

1. Identifying and justifying the need.
2. Selection of means, agencies, or channels available for meeting the need.
3. Evaluation and selection of product.
4. Utilization.

Each step expands from the previous step like the formation of concentric waves when a stone is dropped into a body of quiet water and each has many ramifications. The following discussion of each step will briefly explain the points. In step one the chart indicates that to have refrigeration in the home is not only justifiable for personal health and convenience and economy, but has become a necessity because of changing industrial and social activities in transportation, ways of living in modern city residences and apartments. There is no longer a season for many fruits and vegetables, since fresh strawberries and radishes can now be purchased in the coldest and hottest weather. The economy of buying in quantities, and the creation of new methods of food preparation also point to identifying and justifying the need.

Selection of means, agencies, or channels available for meeting the need in this episode have a method of self-selection determined by conditions which created the need. Most of the means are of a past age rendered obsolete and inefficient by progressive industrial technology. Mechanical refrigeration is adaptable to any shelter and to most any location. It is economical and provides flexibility which produces predetermined low temperatures with accelerated freezing.

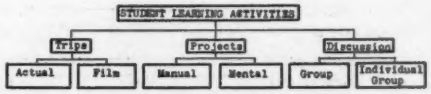
The evaluation of mechanical refrigeration is divided into eight parts, namely: the cabinet, cabinet details, capacity, mechanical efficiency, cooling efficiency, refrigerant, operating economy, and gadgets. The chart lists the many subdivisions of each. It is in this step that shop or home activities will take place.

Materials such as insulation and finishes can be studied from text references and many test experiments are possible by measuring and comparisons with temperature inside and outside the box, measurement of running time and amount of electricity or gas used. Shock hazards, corrosive susceptability, and efficiency of mechanical details may also be analyzed.

In the last step, that of utilization technique, it is necessary to present data which will give the consumer techniques for getting the longest life out of the refrigerator as well as the greatest utility. Refrigeration costs increase with the age of the unit and also with improper use. Here the industrial education instructor should coordinate his studies with those of the home-economics instructor for this department is doing much in developing good utilization.

In addition to the four steps involved in the buying situation, the following aspects also are pertinent and should be included in class discussion of every episode.

1. The effect of technological change upon the product and an outline of probable trends such as increasing efficiency and similarity of mechanical designs. Recent engineering has done much to make refrigerators more economical and the sales technique of "skimming the cream" has gotten to the point where prices should come down.
2. The effect of social change upon the product such as standards of living, place of living, and government subsidization of housing and appliance ownership.
3. Related information of a technical nature including: the refrigeration cycle, commercial refrigeration, trends in design, detailed study of materials used in construction, and detailed study of mechanics.
4. Related information pertaining to occupational guidance wherein a survey of what workers do in manufacture, and distribution, where workers live. Labor conditions in the industry, and policies of different manufacturers. Many consumers also consider buying according to the policy of the owners of the industry toward employees as well as the technical efficiency of the product.



For the discussion of methods, a study technique for the instructor known as "the scientific method"* is recommended and is outlined as follows:

1. A clear statement of the episode.
2. The collection and the recording of them in usable form. A survey of all publications.
3. The observation, collection, and recording of all possible present facts relating to the problem and a study into new fields and those not fully covered in present facts. This entails personal visits, interviews, and correspondence with organizations and persons who have had experience with similar problems. The bibliography at the end of this article, lists a number of such sources of information.
4. The analysis and classification of present and past facts in terms of a given episode.
5. Test and retest of the completed episode by repetition in investigation and use and re-use of the episode in presentation as long as its value proves to be correct and adequate.

The following diagram presents an objective division of content according to teaching procedure:

Specific suggestions for work activities by students which have been found satisfactory are:

1. Collection, compilation, and analysis of advertisements.
2. Field trips to listen to sales talks of different dealers, to be followed by compilation and analysis.
3. Dramatization of the selling scene with critical analysis.
4. Testing and technical examination in the school shop and in the home.

In conclusion, here are some suggested fields for consumer episodes in the electric shop with references for text material. The development of the episode according to the accompanying chart does not entail a great amount of work for the instructor. It is primarily meant for student development wherein he learns on his own initiative, acquires an understanding of technical problems, and looks upon merchandise with a critical evaluation, seeking a product which gives the customer the most for his investment.

Suggestive fields for a study of consumer episodes:

Small home appliances that use electricity for heat effect.
Home appliances that use electricity for power.
The electric kitchen.
Home lighting.
The electric laundry.
Radios, a study of the price ranges.
Wiring the home for radio.
Wiring the home for signals.
Adequate wiring for light and power.
Electricity and the heating system.
Storage batteries.
Special adaptations of electricity for the farm.

References

Consumers Union, Inc., 17 Union Square West, New York, N. Y.
Intermountain Consumers Service, Denver, Colo.
Federal Trade Commission, Washington, D. C.
Consumers Research, Washington, N. J.
Cooperative League of the USA, 167 West 12th., New York, N. Y.
Cooperative Distributors, Inc., 30 Irving Place, New York, N. Y.
"Consumers Guide," U. S. Dept. of Agriculture, Washington, D. C.
Bulletin 72, "Electric Equipment in the Home," Univ. of Maryland, Extension Service, College Park, Md.
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Pull-up chair. Submitted by Harry L. Barta, Bay View High School, Milwaukee, Wis.

*Modern Management, J. E. Walters, McGraw-Hill Book Co., Inc., New York City.

Apprenticeship — Old and New

ROBERT TWEEDSIDE
Hamilton, Ontario, Canada

The youth who leaves the modern technical or trade school to become apprenticed to some practical branch of industry little realizes how lucky he is, compared with the apprentice of the "good old days." A hundred years ago life was undoubtedly simpler than it now is, but a much greater part of the mechanic's waking hours was spent at his daily labor, twelve hours a day and more being general.

All over England six o'clock in the morning was the usual starting hour in many trades. People had to live much nearer to their work or allow a longer time for traveling. In the writer's home town as late as 1914 the curfew bell, a relic of Feudal times, was rung in the belfry of the townhall, high over the town, from 8 to 8:15 each evening. The same bell sounded its disturbing note from 5 to 5:15 in the morning to rouse the factory workers. The apprentice started at a trifling wage and performed many menial tasks of the lowest order before arriving at the use of tools. In one of the small local shops the short and corpulent old Scotsman, who owned the business, entering unobserved, found two of the lads in a scuffle on the earthen floor. He stood aghast at the spectacle, and when, becoming conscious of his gaze, they slunk to their jobs at the bench, he thundered forth, "Lads, lads, ye micht jist as weel pit your haunds into ma pocket and tak the money oot!" This to boys serving seven years and beginning at half-a-crown, or sixty cents a week!

Labor in the old days was less specialized, so that a greater proportion of all-round mechanics was turned out. They were very handy men in the true sense: a millwright, for instance, could work just as well with wood as with metal, and would very likely be able to do his own blacksmithing. The workman would often follow his job around the shop and himself operate the various machines such as lathe, planer, boring machine and drill as he needed them. As the finished work was the result of fewer hands it embodied more of the personality, one might say, of those who constructed it. The result was that the workman took a greater personal pride in the quality of the product of his hands and in the skill that he exercised. The more ambitious young man who wished to supplement his handicraft by technical knowledge had often to do so by laborious home study after a hard day's work, or by attendance at evening classes usually far from his place of employment.

Workshops were not then the spacious and well-lighted places that are now erected. One needs only to glance at pictures of the original buildings of old established firms to see this — barnlike edifices of many stories, with steep roofs and rows of tiny windows and a projecting beam over the doorway for hand-operated tackle to unload lorries; and often beside a stream or pond to utilize natural power for running the rumbling water wheel. There was an absence of elevators and cranes; no central heating, nor comfortable lunchrooms and washrooms. Promotion came only to those who, in addition to being capable, were robust enough to endure hard physical conditions, by a process akin to the survival of the fittest. There was little or no cooperation between the school where the boy received his preliminary education and the firm with which he was to serve his time.

Apprenticeship is literally a period of learning whereby an acquired trade skill is passed on to others and a supply of craftsmen maintained. It is a mutual relationship under which a novice is taught the art of a trade by one who is engaged in it. The system is much older than the medieval trades guilds, for in Ancient Babylon it was legally controlled, and the relationship between employer and apprentice was then modeled on that of father and son.

Formerly, when deeds were drawn up by lawyers, the edges of the original and the copy were notched or indented, to ensure that the duplicate was an exact copy and not a forgery. The written agreement then in vogue between the apprentice and his master was indented in the same way and was therefore termed the indenture. This document stated the respective rights of the apprentice and the employer, and was signed by the two parties and the parent or guardian.

The period prescribed by the medieval guilds of Europe was usually three to five years in France, but in England the common term was seven years. In many industries the period is simply customary and traditional and is not necessarily the time required to train a boy to competency, particularly under modern conditions. James Nasmith (1808 to 1890), the inventor of the steam hammer, once received a visit from trades-union delegates who sought to insist that none but men who had served a seven years' apprenticeship should be employed in his works. His reply upheld what he termed "free trade in ability." "I told them that I preferred employing a man who had acquired the requisite mechanical skill in two years rather than another who was so stupid as to require seven years' teaching. The delegates considered this statement as preposterous and heretical, but in the long run we carried our point."

In England the Statute of Artificers enacted in 1562 under Queen Elizabeth nationalized the provisions of the London craft guilds, which permitted only householders to take apprentices, required a minimum period of seven years, and fixed twenty-four years as the minimum age at which an apprentice could be out of his time. In addition to training the apprentices, the masters generally furnished board and lodgings and agreed to supervise their morals and conduct.

The parchment indenture of a plumber and tinsmith reproduced in this article is typical of the kind of agreement in force in England during the nineteenth century. While it is dated less than fifty years ago, it is evident from its provisions, phraseology and general style that it is devised from a much older form. To quote: ". . . The said Apprentice his Master faithfully shall serve, his secrets keep, his lawful commands everywhere gladly do. He shall do no damage to his said Master, nor see to be done of others, but to his Power shall tell or forthwith give warning to his said Master of the same. He shall not waste the goods of the said Master nor lend them unlawfully to any. He shall not contract Matrimony within the said Term nor play at Cards or Dice tables or any other unlawful Games whereby his said Master have any loss with his own goods or others during the said Term, without license of his said Master: shall neither buy nor sell: he shall not haunt Taverns or Playhouses nor absent himself from his said Master's service day or night unlawfully, but in all things as a faithful Apprentice he shall behave himself towards his said Master and all his during the said Term." The clauses relating to marriage, dice tables, taverns and playhouses sound amusingly quaint and serve to remind us how far our present ideas of personal liberty are from the Puritanical restrictions of the past. By the middle of last century apprentices no longer lived with their masters because of the increasing size and impersonality of industry. Hence the provision as to board and lodging is deleted. The hours of labor were from seven A.M. to seven P.M. and four P.M. on Saturdays, with intervals for breakfast and lunch. Contrast the initial "shilling per week" with the pay of a modern apprentice, which generally covers his board and lodging.

As long as handicraft production was carried on in small units the relation between apprentice and master was intimate and promotion into the rank of master was fairly certain. But as the size of the producing units increased, the lot of the apprentice became less favorable. The masters were more likely to be merchants and employers rather than fellow craftsmen. When his time was completed the apprentice became a journeyman. Strictly speaking this means a man hired by the day, though the term is now applied in general to any workman who has served an apprenticeship and works for an employer.

As the factory system developed, with its further subdivision of labor due to the introduction of machines, apprenticeship naturally declined because less skill was required in the great mass of the workers. The former long periods of training became less necessary except for a small proportion comprising engineers or designers and supervising force. These needed more than the craftsman's skill with bare fingers and observant eyes, and knowledge of the principles of their work could not be acquired between employer and apprentice being that of mutual interest.

Firms that employ a high percentage of technical help on drafting, calculation, experimental and research work, frequently allow students of universities and technical colleges to work in their factories between college terms, generally in the practical end of their businesses. After graduating from college the young man who has completed the necessary number of shop periods and shown himself acceptable to the firm after this virtual apprenticeship, is often given a place on the technical staff.

Not so long ago, when attendance at school well into the teens was not compulsory, the apprentice could start young and be out of his time about the age of 21. With the rising of the general standard of adolescent education and the tendency toward greater specialization in occupations, the starting age has also risen until now 16 to 18 is common. Twenty is probably too late for a beginner: a boy of that age and corresponding stature doesn't like to be classed among younger fellows, or to be earning the comparatively low apprentice wage when he has attained manhood's years.

This Indenture Witnesseth That Charles John Cooper
Son of Charles John and Eliza Cooper
Adolphus Ballard
the 22nd day of June
Seven Years from thence next following to be fully complete and ended During
Adolphus Ballard on condition of the foregoing
undertakes to teach
Plumber and Tin Smith
Paying as Wages one shilling weekly for the first year advancing one shilling per annum
till the end of the term.
Victoria
Witness Alfred Rason
Adolphus Ballard
Charles Cooper

in the workshop. So there arose schools of applied science to furnish the fundamental training in the related subjects of mathematics, physics, and chemistry, upon which so much of the methods of modern production depend.

At one period premium apprenticeship, which catered to a preferred class, had its vogue. By it sons of the wealthier classes were indentured to firms with the understanding that in return for a certain sum paid by the parent or guardian, the youth would be privileged to gain experience in various prescribed phases of the work in a quicker and easier manner than the ordinary apprentice from the lower classes. The aim was to enable the young man to fit himself for executive rank without the tiresome drudgery of slow ascent. While it doubtless succeeded when the lad had the necessary interest and ability to avail himself of its advantages, it is no longer popular in this more democratic age. Most employers prefer to choose as their apprentices intelligent and well-conducted boys who have an inherited or expressed desire for the particular trade, and to pay them fairly for services rendered, the only bond

In many occupations there is no substitute for manual skill, and a considerable period of handicraft training at the job itself is still needed. Here apprenticeship remains in a modified form, but at wages that are much more attractive than formerly. Nevertheless there is always the temptation for young fellows to avoid apprenticeship because of its implied ties and the lure of immediate higher initial earnings that fall to the unskilled worker.

The written agreement is now seldom used, for in these days of easier transition from job to job and place to place it is more difficult to bind the youth, who may not, after all, turn out just to his employer's liking, nor the work to his. When the agreement is verbal it is usually accompanied by definite rules in printed form and in simple language. It then covers such points as conduct, probationary period, provision of tools, bonuses, length of term in hours as well as years, wage schedule, technical tuition during apprenticeship, dimissed last time, and termination procedure.

The technical and trade schools usually cooperate with local manufacturers in the training of their apprentices, often by holding a half-day class per week in a course of study approved by the firm. The tendency of late years is also to provide some form of public instruction and supervision for that large body of juvenile workers who are temporarily employed at unskilled jobs of the "blind-alley" type. Though not altogether favored by employers the vocational and part-time continuation schools embody the more favorable aspects of apprenticeship. Here boys are given training not only in the work in which they are engaged, but also in the work they hope to do. Drafting courses are popular because in many lines of industry the craftsman must be able to interpret designs into wood, metal, and stone. In learning to express on paper the form and proportions of an idea the ingenuity of the young artisan is exercised; and in the school workshops he gains manual skill and reasoning ability which are later of great practical value. Academic

work is not overlooked, as the object is to give the student an all-round education combined with a selected practical training.

Among the larger firms apprentice training now receives considerable attention. As the general policy is to make promotions from among the men who have been trained within the company, the incentive for a young man to make the best possible use of his training and to remain with his parent firm is greatly increased. Each firm now aims at a system of training to suit its particular needs, and the number of former apprentices who have risen to executive positions in the firm is the best indication of the success of that system.

If the average boy is given proper guidance and a chance to show his initiative, he will rise to his employer's expectations, especially if he is allowed a fair amount of variety with an increasing measure of responsibility. When he becomes a journeyman such a young man is likely to be ambitious, fair minded, proud of his skill as a workman, and ready to fill his niche in the community as a useful and respectable citizen.

Exchanging Ideas

JESSE E. RATHBUN

Presidio Junior High School, San Francisco, California

Mr. Charles E. Barker, director of trade, vocational, and industrial-arts education of the San Francisco public schools, has initiated a plan whereby the department office becomes a clearing house of ideas. Upon investigation it was found that many interesting and worth-while ideas and teaching devices were in everyday use that were unknown to many members of the department. As Mr. Barker expressed it, "When we formulate a plan to collect material for distribution no doubt many splendid ideas will come out of 'hiding.'"

For some time the department office has made available approved plans in blueprint form for use in the shop classes. The idea of collecting and distributing plans of various teaching aids and devices is another step forward in maintaining an up-to-date system which is of real service to the teacher in dealing with everyday teaching problems.

In the department at present are men with many years of teaching experience. Many devices used by them are original, having been developed after years of experimenting, trying, and discarding, until a satisfactory and highly practical aid to teaching had been produced. Many of these ideas have never been passed on except as someone happened to come upon something that he could use.

This situation is not peculiar to any one system. No doubt every system has much the same conditions existing. Shop teachers are aware of this fact as is indicated by the interest shown in visiting other shops. Some administrators attach so much importance to knowing what is in other schools that teachers are allowed a visiting day. Of course, teachers realize the limited possibilities of visiting. As a result of these limits other methods of exchanging ideas must be employed.

A well-organized plan to exchange ideas within a large department seems to have unlimited possibilities. Plans of teaching aids may be prepared for distribution by blueprinting, mimeographing, or by other means of duplication. Models are often left in the director's office for others to inspect. In this way, new ideas and new plans for projects find their way to the various schools through this clearing house of ideas.

The next step, of course, would be an interdepartmental exchange. If many departments were to maintain a similar organization, a free exchange of material between departments might be established easily.

Professional magazines might function in the same manner. Then the teacher, trying to solve a troublesome teaching problem, would only have to search through his professional magazine to find out how other successful teachers had overcome similar difficulties. In like manner, teachers who have worked out a solution for a troublesome problem should use their professional publication to pass it on to others who may be desirous of that information. To do this successfully one must illustrate and describe the ideas clearly. Drawings, sketches, illustrations, and the printed word are all necessary for effective description.

Contributions of such material, in most cases, has been left to the individual teacher. There are numerous known cases where splendid ideas have been developed, but no attempt has ever been made to pass them on. Teachers with originality and ability often do not care to organize material and contact the publisher. As a result many fine teaching aids are never made available to a large number of teachers. Herein lies the advantage of the department functioning as an agency to collect and prepare material useful to teachers. Once material is collected it can be organized and put into form to serve as many as care to take advantage of it.

In the San Francisco department this plan was conceived for the sole purpose of making the department of more service to the teachers. Many of the ideas found in the department are believed to be of interest to a great many shop teachers. As a result of this thought several devices and ideas were prepared for possible publication. If they are worthy of attention they may be passed on for others to consider.

Other departments could also make fine contributions by organizing such material for publication in cases where individual teachers do not care to do it.

Many fine ideas would come to light which certainly would not otherwise. Devices and aids which help to make teaching more effective and interesting are always welcome to progressive teachers.

Any plan to make such material available is of real service to the profession. A department which functions in this capacity serves a recognized need and renders a valuable service to the teachers.

Examples of Helpful Material

The Squaring-up Process Simplified

Submitted by The Industrial-Arts Department, San Francisco public schools, Charles E. Barker, Director

Wilbert Vestnys, Contributing Teacher

Learning the squaring-up process often becomes an unpleasant task to the pupils because there are rules to learn, which must be memorized and followed in consecutive order. The squaring-up process is simplified tremendously by this simple illustration which gives the pupil a visual impression of his task. It is not intended to eliminate the demonstration, however. It can serve as a useful method of review which is a necessary part of learning with all types of pupils.

The rules are given in order in their proper relation to the board. They begin to carry a meaning when the whole thing can be summed up at a glance.

Probably the most effective method of using this illustration is to place it in the shop and urge the pupils to consult it as the need arises. Of course, each boy should have his own copy in his notebook if this is at all possible. When the boy cannot quite remember which step he should follow, send him to seek the answer instead of telling him outright or merely referring to rule number four.

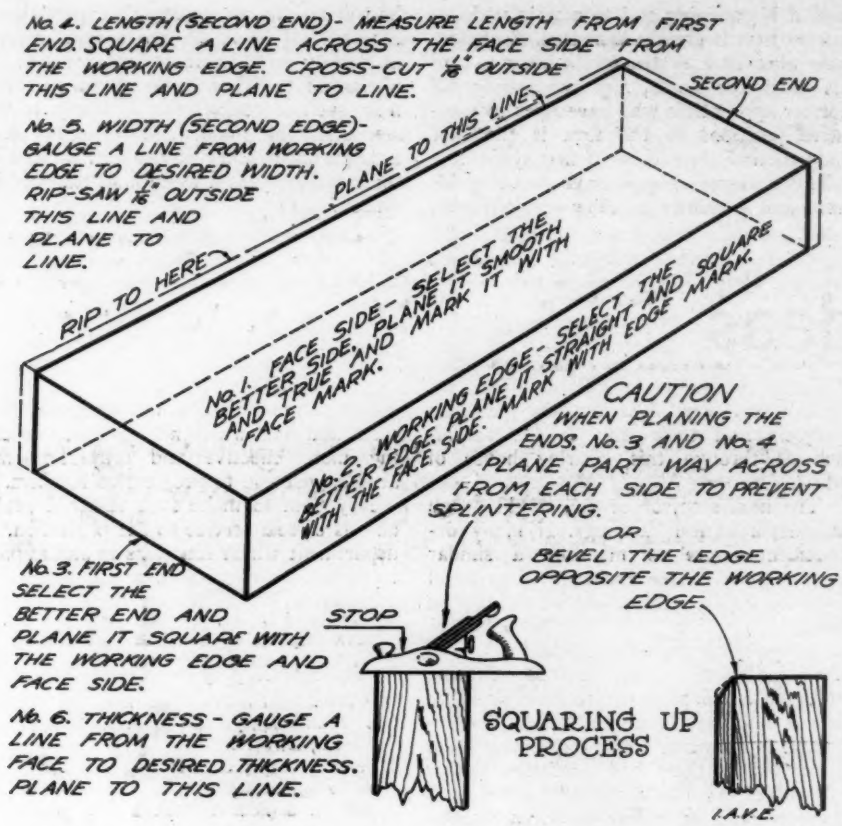
Such visual aids in teaching also have a tendency to stimulate a keener interest in the work than is ordinarily present otherwise.

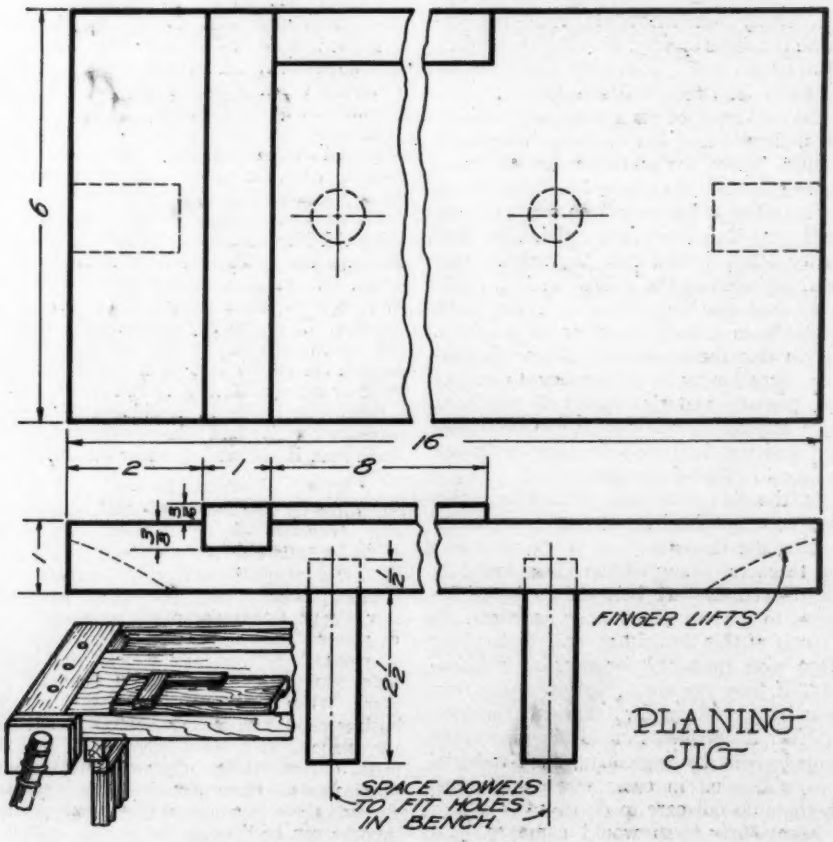
Planing Device

Submitted by The Industrial-Arts Department, San Francisco public schools, Charles E. Barker, Director

Wilbert Vestnys, Contributing Teacher

The planing device described herewith, solves a very annoying problem; namely that of planing small thin boards. This seemingly simple task is especially difficult for beginning pupils who lack skill in handling the plane. When placed in the vise a thin board buckles enough to make planing difficult, and the plane iron is frequently dulled on the metal devices holding the work. This device eliminates all these troubles. The work lies flat and there is no metal where any possible damage can be done to the plane.


No. 4. LENGTH (SECOND END) - MEASURE LENGTH FROM FIRST END. SQUARE A LINE ACROSS THE FACE SIDE FROM THE WORKING EDGE. CROSS-CUT 1/16" OUTSIDE THIS LINE AND PLANE TO LINE.
No. 5. WIDTH (SECOND EDGE) - GAUGE A LINE FROM WORKING EDGE TO DESIRED WIDTH. RIP-SAW 1/16" OUTSIDE THIS LINE AND PLANE TO LINE.
RIP TO HERE
PLANE TO THIS LINE
SECOND END
No. 1. FACE SIDE - SELECT THE BETTER SIDE, PLANE IT SMOOTH AND TRUE AND MARK IT WITH FACE MARK.
No. 2. WORKING EDGE - SELECT THE BETTER EDGE. PLANE IT STRAIGHT AND SQUARE WITH THE FACE SIDE. MARK WITH EDGE MARK.
CAUTION
WHEN PLANING THE ENDS, No. 3 AND No. 4 PLANE PART WAY ACROSS FROM EACH SIDE TO PREVENT SPLINTERING.
OR
BEVEL THE EDGE OPPOSITE THE WORKING EDGE
No. 3. FIRST END SELECT THE BETTER END AND PLANE IT SQUARE WITH THE WORKING EDGE AND FACE SIDE.
No. 6. THICKNESS - GAUGE A LINE FROM THE WORKING FACE TO DESIRED THICKNESS. PLANE TO THIS LINE.
STOP
SQUARING UP PROCESS
I.A.V.E.



The following hints, resulting from experience, will be helpful to the teacher. Fit the cross member tightly in the dado but do not glue it, because occasionally it becomes necessary to replace it. Make the base out of rough material and leave it rough because the added friction will aid in preventing the work from slipping.

Setting Tile

Submitted by The Industrial-Arts Department, San Francisco public schools, Charles E. Barker, Director
Jesse E. Rathbun, Contributing Teacher

Setting tile, such as in coffee tables, and the like, is often looked upon as a task involving problems which require considerable time and skill. The simple method described herewith, adequately meets this problem and is quite satisfactory. Simply glue the tile in place. There is no problem of leveling up the tile, no rushing to get through before the plaster sets, and no mess to clean up after the job is done. Junior-high-school boys can handle the job without the aid of the instructor.

Many people desire that the tiles extend slightly above the wood enclosing them. The cardboard filler takes care of this perfectly, as shown in the illustration. Simply leave a space the exact thickness of the tile, the cardboard of the right thickness then does the rest.

Make the frame as usual, allowing sufficient space for the plaster cracks. After the glue has set tamp in the plaster and wipe off the joint as desired. Nothing could be simpler.

The cardboard filler also makes a better gluing contact between the wood and the tile. Cardboard from the laundry over which shirts are folded is ideal for this purpose. Large blotters are good when plenty of glue is used.

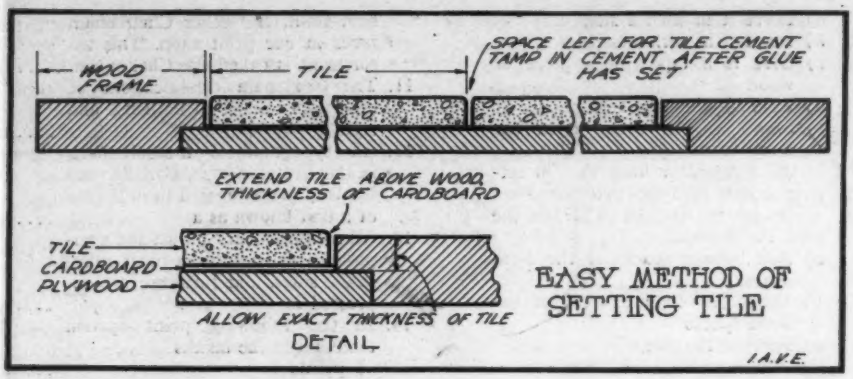
Any good grade of glue will be satisfactory. A good grade of hot glue and casein glue have been tried and found to be satisfactory.

It will be interesting to many to know that experienced tile setters have approved this method for the type of work ordinarily done in the school shop.

Colored glass and composition materials are becoming very popular in table tops and especially in coffee tables. The process of gluing such materials down is equally simple. Since ordinary glue is brittle and glass and composition materials are not porous a latex base cement should be used. Put on a priming coat of the cement and allow to stand until it is almost set. then put on another application and set work in place and allow to stand for several hours.

Mirrors may be set successfully in a similar manner but glue and cements should not be used on mirror backs because eventually the plating will scale off. Mirror mastic, obtainable at any glass works, may be used safely for cementing mirrors in place.

"Oftentimes leisure can be profitably employed. While there are some people out of work who are well educated, there are many others who were displaced because they were not sufficiently trained to hold their places. When the time comes to reduce the force, those go first who cannot compete with their more skilled fellow workmen. As our industrial life becomes more complex and requires more and more technical knowledge, it will be increasingly difficult for the unskilled to find and hold employment. High wages require a high



earning capacity. With the present school facilities for the young, this situation will come to take care of itself. But the condition would be very serious for those who have already reached maturity without such advantages, except for the opportunity that is afforded by the night schools and university extension." — *Calvin Coolidge.*

"In our common schools and in our special schools, those who labor must be trained for vocational efficiency, and given a sense of their responsibility for promoting the national welfare." — *Ellwood P. Cubberley.*

Testing and Tests

TESTS FOR THE PRINT SHOP

T. Edwin Keyes,
State Trade School,
Bridgeport, Connecticut

Learning Factors to be Tested

Unit I — Principles of Typesetting

I. Type
- *a*) Kinds
- *b*) Height
- *c*) Ingredients
- *d*) Parts
- *e*) How sold — fonts
  - (1) Weight
  - (2) Job
- *f*) Kerned
- *g*) Classifications
  - (1) Series
  - (2) Families
  - (3) Body
  - (4) Display
- *h*) How measured
  - (1) Point system
  - (2) Printers' rule

II. Type cases
- *a*) News
  - (1) Upper
  - (2) Lower
- *b*) California
- *c*) Triple
- *d*) Sizes
- *e*) Racks
- *f*) Lay of the case

III. Spacing material
- *a*) Leads and slugs
- *b*) Brass leads
- *c*) Lead cases and racks
- *d*) Method of piecing leads
- *e*) Spaces and quads
- *f*) Brass and copper, thin spaces
- *g*) Metal furniture
- *h*) Wood furniture

IV. Procedure or process in setting type
- *a*) Composing sticks
  - (1) Origin
  - (2) Features
  - (3) Parts
  - (4) Care of
  - (5) Adjustment devices
- *b*) Method of holding stick
  - (1) Posture at the case
- *c*) Reading type
- *d*) Justification
  - (1) Meaning of
  - (2) Purpose
  - (3) Methods
  - (4) Test of
  - (5) Cautions in
  - (6) Quadding out a line
- *e*) Spacing out lines
  - (1) Difference between justification and spacing
  - (2) Uniform spacing
  - (3) Correct method
  - (4) Wrong method
- *b*) Emptying the stick
- *c*) Tying up forms

V. Handling type forms
- *a*) The galley

Tests

Unit I — Principles of Typesetting

Part I — Multiple-choice test

Directions: The following statements are incomplete. Below each of the statements is a list of answers. Place a line under the word or phrase that makes a correct statement. In the parentheses ( ) at the right of each statement place the letter preceding the statement that you underline.

Sample:

1. The 42-line bible was printed by (*c*)
   (*a*) Caxton (*b*) Manutius (*c*) *Gutenberg* (*d*) Bodoni
2. Type is classified into *four* general groups ( )
   - *a*) Foundry type
   - *b*) Zinc type
   - *c*) Copper type
   - *d*) Linotype
   - *e*) Monotype
   - *f*) Wood type
3. Wood type is used in preference to foundry type in large sizes because it is ( )
   - *a*) Cheaper to manufacture
   - *b*) Prints better
   - *c*) Easier to handle
   - *d*) Not so heavy
   - *e*) Easier to clean
4. All type is of uniform height, which is ( )
   - *a*) .718 of an inch
   - *b*) .817 of an inch
   - *c*) .918 of an inch
   - *d*) .819 of an inch
   - *e*) .768 of an inch
5. "Type high" is the measurement of type from its feet to its ( )
   (*a*) Pin mark (*b*) Neck (*c*) Beard (*d*) Shoulder (*e*) Face
6. Foundry type metal is made from an alloy of ( )
   - *a*) Lead, tin, and copper
   - *b*) Lead, tin, and zinc
   - *c*) Lead, tin, and antimony
   - *d*) Lead, zinc, antimony, and copper
   - *e*) Lead, tin, antimony, and copper
7. Job fonts are made up in accordance with standard schemes for apportioning the amounts of each character, and the quantity of type in a font is indicated by ( )
   - *a*) The number of capital E's
   - *b*) The number of capital A's
   - *c*) The number of capital E's and lower-case e's
   - *d*) The number of capital A's and lower-case a's
   - *e*) The number of capital A's and lower-case e's
8. The portion of the face of a letter projecting beyond the body of the type is called the ( )
   - *a*) Neck
   - *b*) Beard
   - *c*) Counter
   - *d*) Kern
   - *e*) Stem
9. Type is cast in different sizes in standard graduations and the various sizes of any one kind is known as a ( )
   - *a*) Family of type
   - *b*) Series of type
   - *c*) Gradation of type
   - *d*) Group of type
   - *e*) Font of type
10. Type is measured for size or thickness by measuring ( )
    - *a*) From the shoulder to the feet
    - *b*) From the nick side to back
    - *c*) From the face to feet
    - *d*) Pin mark to other side
    - *e*) From the groove to face
11. The printers' system of measurement is based upon the ( )
    (*a*) Inch (*b*) Foot (*c*) Em (*d*) En (*e*) Point
12. Type is set nicks up because it ( )
    - *a*) Is customary
    - *b*) Is a guide to compositor
    - *c*) Looks better
    - *d*) Is easier to handle
    - *e*) Doesn't pi as easily
13. The printers' rule is called a ( )
    - *a*) Scale
    - *b*) Rule
    - *c*) Line gauge
    - *d*) Stick
    - *e*) Point stick
14. A pair of full-size cases holds type weighing ( )
    - *a*) 80 lbs.
    - *b*) 60 lbs.
    - *c*) 90 lbs.
    - *d*) 40 lbs.
    - *e*) 70 lbs.
15. The oldest style of cases are the ( )
    - *a*) News cases

b) Two third cases
c) California job cases
d) Triple cases
e) Three quarter cases

16. The boxes of the lower case are not arranged alphabetically because ( )
a) The early printers were illiterate
b) It is handier the way they are placed
c) It is the customary arrangement
d) The alphabet was not finished when the first case was made

17. The most common thickness of leads is ( )
a) 5 points *d*) 2 points
b) 6 points *e*) 3 points
c) 8 points

18. The most common thickness of slugs is ( )
a) 5 points *d*) 2 points
b) 6 points *e*) 3 points
c) 8 points

19. One-point spacing material is made ordinarily from ( )
a) Lead *c*) Brass *e*) Copper
b) Tin *d*) Wood

20. When piecing leads, the proper method is to ( )
a) Use long and short leads alternately
b) Use all the long leads on the right
c) Use all the long leads on the left
d) Use leads of equal lengths
e) Use a long lead in the center and short ones on each side.

21. The size of an em quad of 8 point is ( )
a) 8 points *d*) 32 points
b) 4 points *e*) 64 points
c) 16 points

22. The size of an en quad is ( )
a) ¼ an em *d*) 4 times an em
b) ½ an em *e*) 2 times an em
c) ⅛ an em

23. The size of the 3-em space is ( )
a) 1/3 an en quad
b) 3 times an em quad
c) 3 times an en quad
d) 1/3 an em quad
e) 3 picas

24. The workman who sets type by hand is called a ( )
a) Stoneman *d*) Pressman
b) Compositor *e*) Case man
c) Setter

25. Pick out the three essentials of a good composing stick from the following list ( )
a) It has pica notations inscribed ( )
b) It has a clamp-type movable knee ( )
c) It will not rust
d) It may be set quickly
e) It has a screw-adjusting knee
f) Its sides are exactly parallel and at right angles to the bottom and back plates
g) It is made of durable material

26. Printers read type from ( )
a) Left to right and upside down
b) Right to left and right side up
c) Left to right and right side up
d) Right to left and upside down

27. A line is properly justified when it is ( )
a) Set without errors
b) Firm in the stick
c) Very tight in the stick
d) Loose in the stick
e) Read over and corrected

28. If the last type in the line is tight, the compositor should ( )
a) Force it in with a slug
b) Force it in with a knife
c) Give it a tap with a piece of wood
d) Remove the line and respace it
e) Shave a little metal from the body of the type

29. If the compositor finds that in setting a line of type that the 3-em spaces are not enough to fill out the line, he should ( )
a) Add thinner spaces to the 3-em spaces
b) Substitute 4-em spaces for the 3-em spaces
c) Reword the line
d) Add en quads to the 3-em spaces
e) Add em quads to the 3-em spaces

30. Extra space should be placed between words ending with ( )
a) Descending letters
b) Punctuation marks
c) Quotation marks
d) Ascending letters

31. Spaces at the end of a type line should be placed ( )
a) Between quads
b) After the quads
c) After the last type in the line
d) Before the final quads in the line

32. Before emptying the stick into the galley, the galley should be set ( )
a) On bank with head resting on edge
b) With head at the compositor's right
c) With head at the compositor's left
d) With foot resting on edge of bank
e) On top of the type case

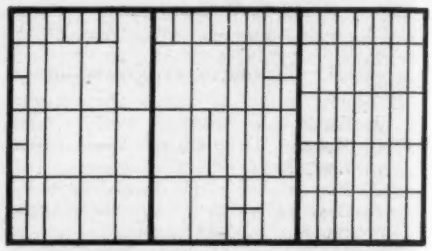
33. To prevent type from being pied in handling ( )
a) A rubber band is stretched around it
b) Glue is applied and allowed to run between the type
c) String is wrapped around it a number of times
d) String is looped with a knot and the type is tied

Part II — Completion Test

Directions: Fill in the blank spaces with the word or words needed to make a complete sentence.

Sample:
1. A boy who is learning a trade is called an (apprentice) .....

2. The keyboard operated machine which casts type on a slug is called a .....
3. The keyboard operated machine which casts type individually is called a .....
4. The term "height to paper" is the same as .....
5. Antimony is used in type metal to give it .....
6. Tin is used in type metal to give it .....
7. Type is sold to the printer by the .....
8. Display type is put up in small assortments known as .....
9. The compositor to prevent wrong fonts in a line which he is setting, guides himself by glancing at the .....
10. We have Cheltenham Oldstyle series, Cheltenham Italic, Cheltenham Bold, and other Cheltenham faces in our print shop. This assortment is called the Cheltenham .....
11. The two main classifications of type with respect to both use and style are .....
12. All typographical measurements in the United States, Canada, and England are expressed in multiples of a unit known as a .....
13. All measurements for setting composition and for using brass rules, leads, slugs, and furniture are expressed in .....
14. In the following point system table, fill in the blanks
6 points = ...
12 points = ...
6 picas = ...
72 points = ...
72 picas = ...
15. News cases are used in pairs called .....
16. The most widely used type case today is the .....
17. The triple case is used for fonts which contain only .....
18. In most modern plants, open stands have been replaced by .....
19. Fill in the case attached below, with the proper letters



20. Thin strips of soft type metal, less than type high, used for spacing material are called .....
21. ..... and .....
22. If the width is less than six points they are .....
23. If the width is six points or more they are .....
24. Spaces used in the type case include ..... and .....
25. Quads used in the type case include .....
26. Thin spaces, one half point thick, are made of .....
27. Thin spaces, one point thick, are made of .....
28. Metal blocks used for blanking out wherever an area of white space is desired in a type form are given the name .....
29. Fill in the lengths that make up the standard scheme of metal furniture .....
30. Fill in the blanks with the numbers that represent the widths of a standard scheme of metal furniture .....
31. Wood furniture is used principally for .....
32. Wood furniture in a narrow strip form is called a .....
33. The process of assembling the type is called .....
34. The metal tray into which lines of type are composed is called a .....

35. The width of a type line is called its .....
36. The style of composing stick which can be set automatically to measure is known as the .....
37. A popular screw-adjusting stick is the .....
38. The art of making lines of type uniform in length is called .....
39. To justify a line of type which does not fill the measure, replace the 3-em spaces with spaces that are .....
40. To justify a line which is too long, replace the 3-em spaces with ..or..
41. When types are leaning sidewise, they are said to be .....
42. Short lines of characters which do not fill the measure of the stick are completed with ..and..
43. The shallow tray in which lines of type and other materials are assembled is called a .....
44. The raised rim end of the galley is known as .....
45. The open end of the galley is called the .....

Part III — Matching Test

Directions: In the table below in column *A* are the sizes of type in common use today. Column *B* has the corresponding names but not in the correct order. In the parentheses following each name put the number from column *A* that matches the correct size.

Sample of a correctly answered problem:

Col. A	*Col. B*	
1. 4 point	*a*) Excelsior	(2)
2. 3 point	*b*) Brilliant	(1)
3. 4½ point	*c*) Diamond	(3)
4. 5 point	*d*) Agate	( )
5. 5½ point	*e*) Minion	( )
6. 6 point	*f*) Brevier	( )
7. 7 point	*g*) Nonpareil	( )
8. 8 point	*h*) Pica	( )
9. 9 point	*i*) Bourgeois	( )
10. 10 point	*j*) Long Primer	( )
11. 11 point	*k*) Small Pica	( )
12. 12 point	*l*) Great Primer	( )
13. 14 point		
14. 18 point		

Parts of a composing stick:

Column *A* contains the description of the part and column *B* the name. Put the number of the description that fits the part in the parentheses following the name of the part.

Col. A	*Col. B*	
1. The part upon which the feet of the type rest	*a*) Knee	( )
2. The part against which the first line is set	*b*) Base	( )
3. The part used to set the measure	*c*) End plate	( )
4. The part which forms the fixed side	*d*) Back plate	( )

Procedure Test

Holding the stick:

The method of holding the stick consists of the following steps:

Arrange them in logical order by placing the letter preceding the step that comes first in the first parentheses, the second in the second set of parentheses and so on down the blanks.

a) Hold open side out or toward the case ( )
b) Close fingers across bottom of stick ( )
c) Tilt the stick toward you slightly ( )
d) See that composing stick is set to measure ( )
e) Take composing stick in left hand ( )
f) Place a slug of the measure in stick ( )
g) Place thumb of left hand inside stick ( )

TESTS FOR THE PRINT SHOP ON TYPE CASES AND TYPE

E. V. Ahonen,
Junior High School,
Chisholm, Minnesota

Unit Tests for Printing — 1. Elementary Composition

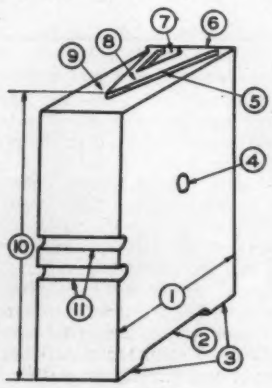
(For Parts 1, 2, 3, and 4, see page 242, June, 1940, issue.)

Name ..... Class.....
Date ..... Grade..... Score.....

Part 5

Directions: A series of incomplete statements follow. In the blanks provided for the purpose, write the word or words that complete the statement.

1. In the negative the lower-case letter b looks like the letter .....
2. In the negative the lower-case letter q looks like the letter .....
3. In the negative the lower-case letter d looks like the letter .....
4. In the negative the lower-case letter p looks like the letter .....
5. In the negative the apostrophe looks like the .....
6. In the negative the lower-case letter u looks like the letter .....
7. In the California job case all spaces are in the ..... division.
8. In the California job case all quads are in the ..... division.
9. All type is uniform in height and is equal to .....
10. There are four kinds of type They are 1....., 2....., 3....., 4.....
11. We always read type in the .....
12. Spacing materials smaller than the en quad are found in the ..... division of the case.
13. All quads are found in the ..... division.
14. There are two letters in the cap case that are not in alphabetical order — They are 1..... 2.....
15. The size of type that we use is .....
16. The letter that is used most often in the English language is the lower-case .....
17. There are five ligatures in our cases; they are as follows: 1....., 2....., 3....., 4....., 5.....



Part 6

Directions: Opposite the proper numbers in the spaces provided, write the names of the various parts of the piece of type shown.

1. ..... 7. .....
2. ..... 8. .....
3. ..... 9. .....
4. ..... 10. .....
5. ..... 11. .....
6. .....

Part 7

Directions: The diagrams which follow, represent the faces of the various spaces and quads that are found in a case of type. The dotted lines show how they compare with the unit. In the blank provided, write the name of the spacing material that the diagram represents.

1. (1 SQUARE) 2. (2 SQUARES)
3. (3 SQUARES) 4. (½ SQUARE)
5. (⅓ SQUARE) 6. (¼ SQUARE)
7. (⅕ SQUARE)

1. ..... 5. .....
2. ..... 6. .....
3. ..... 7. .....
4. .....

Part 8

The following statements when finished will be true. Blanks have been left into which the proper word may be written to properly finish the statement.

1. There are four different kinds or classes of type. They are: 1....., 2....., 3....., 4.....
2. All type must be of the same height. This height is called type high and is ..... in.
3. A complete collection of all sizes and styles of one make of type like "Century" is called a .....
4. A complete assortment of one size and style of type including lower-case letters, caps, etc., is called a .....
5. A complete collection of all sizes in one style of type like Caslon condensed, Century Oldstyle, etc., is called a .....
6. Moveable types were invented by .....
7. The basic ingredients used in the manufacture of type are: 1....., 2....., 3....., 4.....

Two inch flexible hose attached to a combination machine to carry sawdust and jointer shavings to a container from which they may be readily removed. Submitted by Don L. Olson, Public Schools, Dawson, Minn.

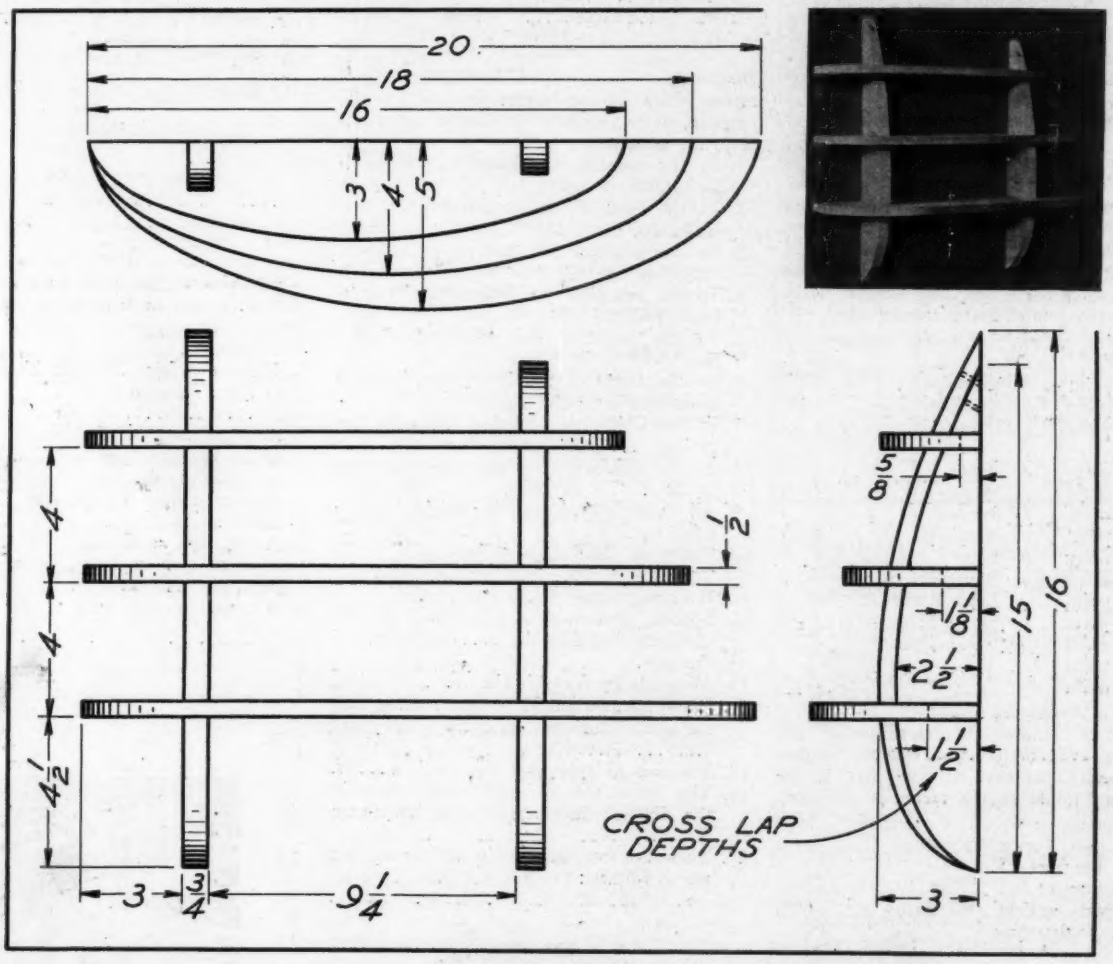
Problems and Projects

WALL SHELF

W. W. White,
Central High School,
Fort Wayne, Indiana

This wall shelf with its airplane-wing shelves was a great favorite with the boys in our woodworking shops.

The sizes given on the working drawing may be altered to suit conditions. The finishes chosen most often were ivory and red, black and red, and black and silver.



Airplane-wing wall shelf

ELECTRICAL PENCIL FOR ENGRAVING ON METAL

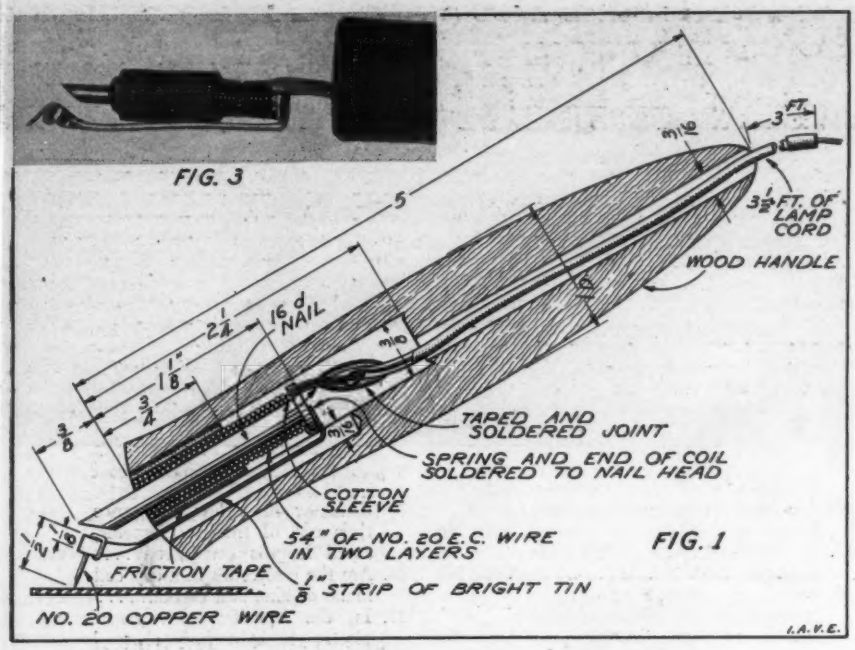
Homer C. Rose,
John Dewey Junior High School,
West Allis, Wisconsin

Good electrical projects are perhaps the most difficult type to design for junior-high-school use. The electrical pencil illustrated herewith has proved to be a most satisfactory eighth-grade project; however it has been so popular and practical that many senior-high students have also asked to make it. It has also met with approval in the shops for the marking of all types of metal tools. The unit will operate successfully on a 6- to 8-volt a.c. or d.c. current, and it may be made for less than 10 cents from materials commonly found in school shops. The pencil is useful for marking tools and projects, even though they may be of hardened steel which will not allow stamping. It may also be used for drawing designs on art-metal work.

In operating the pencil, one line of the circuit is connected to the metal to be marked, the other line is connected to the pencil cord. As the writing point of the pencil comes into contact with the metal, a current passes through the coil, through the metal strip which is soldered to the second end of the coil, through the point, through the metal to be marked, and then back to the source of power. This flow of electricity magnetizes the nail or iron core. This magnet then attracts the iron vibrator which holds the copper point and pulls it up from the metal thus breaking the contact and forming an electric arc which cuts the metal. Since the contact is now broken the magnet no longer attracts the iron coil and the point springs back against the metal so that the action is repeated. The vibration of the point is so rapid that the arc is steady and the pencil may be moved along about as fast as a pen in lettering with ink. The resulting marks on the metal are deep enough to stand polishing, and fine enough to compare with ordinary writing.

As a project for electrical classes it may be used in close relationship with the following electrical topics:

A. Things a student must be able to do:
   1. Select sources of low voltage.
   2. Take meter readings.
   3. Connect dry cells to get proper voltage and amperage.
   4. Set up a transformer.
   5. Test and use a storage battery.
   6. Operate an electromagnet properly.
   7. Select and use conductors and insulators best adapted to particular uses.
   8. Make common electrical connections on wires, etc.



Sectional view of electric pencil for lettering on metal

9. Wind coils and construct electromagnets.
10. Solder small parts of various metals.
11. Operate an electric arc.
12. Anneal steel.
13. Practice safety while using tools, chemicals, and electrical power.

B. Topics student must understand:
1. Use of common electrical tools.
2. Sources of electrical power.
3. Construction and proper use of a battery and transformer.
4. Characteristics of a.c. and d.c. current.
5. Nature of conductors and insulators.
6. Theory of the operation of meters.
7. Theory of magnetism, size of wire, number of turns, etc.
8. Method of procedure to locate electrical troubles and their causes.
9. The electric arc and its uses.
10. Principles of design and construction.
11. Safety precautions.

Method of Procedure

The Handle

1. Select a piece of suitable wood 1⅜ by 1⅜ by 6 in. and turn to dimension shown in Figure 1.

2. With a ⅜-in. wood bit bore a hole 3/16 in. off center to a depth of 2¼ in. Students may choose to wind the handle with heavy string to guard against splitting the wood.

3. Place a ⅜ by 2½-in. iron rod in this hole and drill a 3/16-in. hole beside the rod. The iron rod prevents the drill from drawing over into the larger hole. This 3/16-in. hole should be about 1¼ in. deep. With a knife clean out the wood between the two holes so as to allow the spring to vibrate freely.

4. Drill a 3/16-in. hole from the back to meet the ⅜-in. hole.

5. The handle should be stained and shellacked, or enameled to give the tool a finished appearance.

The Electromagnet

1. Cut a 16d nail to 1½-in. length and anneal by heating, and cooling slowly.

2. File a notch in the head of the nail and down to the body of the nail to allow the cotton sleeve which insulates the wire at this point to lie flat when the coil is started.

3. File the end of the nail to 45 deg. on the side opposite to the notch. All machine marks should be filed from the body of the nail to facilitate a smooth winding of the coil.

4. Cut a 54-in. length of No. 20 E.C. copper wire and place a cotton sleeve or other insulating material over the wire when it passes through the head of the nail leaving about 2 in. of wire extending from the head of the nail.

5. Wind the coil placing about half of the wire in each layer. A very neat and tight coil may be made by placing the end of the nail in the chuck of the drill press and then turning the chuck by hand, while the wire is held tight.

6. The end of the winding, if two layers are used, will come at the head of the nail. This end should be cleaned and soldered to the head. The other end which is held in place by the winding above it should be soldered and taped to 3½ ft. of fixture cord. One half of a drop cord will be satisfactory for this purpose.

The Vibrator and Point

1. Select and clean a foot or so of No. 20 copper wire. Fasten one end of this in a vise and the other in the hard drill chuck, twist the wire until it becomes hard and breaks. Cut off ⅝ in. of this wire and file one end to a point.

2. Cut a piece of bright tin to ⅛ in. (or less) by 2¼ in. Wind about ½ in. of one end of this strip around the center of the copper point. Bend the copper point around this coil as shown in Figure 1. New points may be placed in the coil of the vibrator without unwinding it. Form the strip as shown and solder the other end to the head of the nail beside the end of the coil wire.

3. Run the fixture cord through the ⅜-in. hole and on out through the end of the handle. See Figure 2.

Wrap two or three layers of friction tape around the coil so that the unit will fit securely in the handle. The pencil is then ready to be tested. See Figure 3.

To Use the Electric Pencils

Clean all metal surfaces to be marked. Steel wool or fine abrasive paper should be used to get down to the metal. Lay out guide lines and sketch in the letters, to be made, with a pencil. The guide lines are a necessity if a neat piece of lettering is expected.

Set Up the Pencil

Select a source of 6- to 8-volt d.c. or a.c. power. This may be secured from a 6-volt automobile or radio battery, a set of 4 to 6 dry cells in series, or from a transformer that has a 50 w. output. The ordinary doorbell transformer will not work successfully as it does not form a hot enough arc to cut the metal deeply. *A high voltage such as 110 cannot be used.* Connect the stranded wire from the pencil to one pole of the battery or transformer. Run a wire from the other pole to the piece of metal to be marked, and fasten by clamping. See Figure 4.

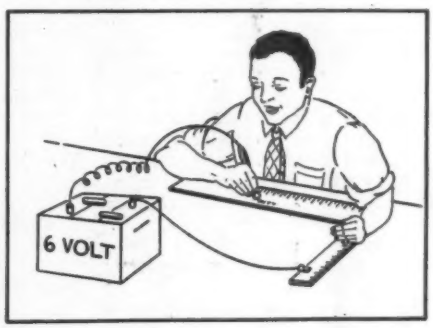


Fig. 4

Try the Arc

Hold the pencil in the writing position and the writing point at right angles to the work. Bring the point gently down to the metal. The point should vibrate and cause an arc between its point and the tool. If an arc is not produced examine the connections and see that the spring which holds the point does not bind in the handle. If the coil becomes hot it is a sign that the point is not vibrating freely.

As soon as the arc is produced move the pencil slowly along the line to be cut. *Work slowly and form the letters carefully — they can be made but once.*

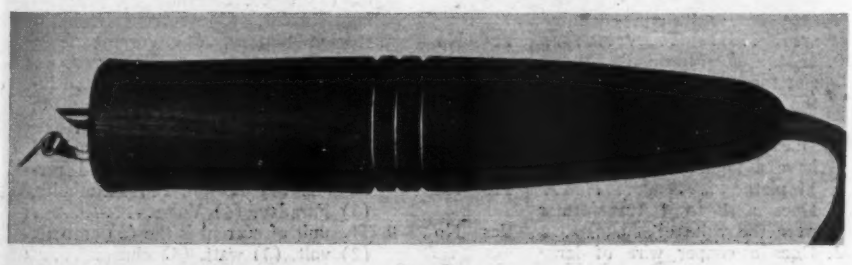


Fig. 2

Keep the Pencil in Working Order

File the point every two or three words with a small file. It is not necessary that the point be round but it must be sharp. When renewing points keep them to within ½-in. length.

The Pencil as a Class Project

The handle of the pencil is perhaps the only part that cannot ordinarily be constructed in the electrical shop. For a number of semesters the 8B woodworking students have been allowed to turn the handle as part of their general woodworking course which precedes the electrical course by one semester. The fact that the student is looking forward to an interesting experiment to come in another shop at a later date, may be a valuable student experience in planning.

Since all of the parts of the pencil are small, accurate work must be secured. The panel shown in Figure 5 may be helpful as it shows each of the steps in the construction. Such a panel can be built in two or three hours and will save many hours which the instructor would otherwise use in redemonstrating the various steps to individuals. The panel may also be used as a visual aid in explaining the operation of the unit. Panels are of interest to outsiders and help them to understand our objectives.

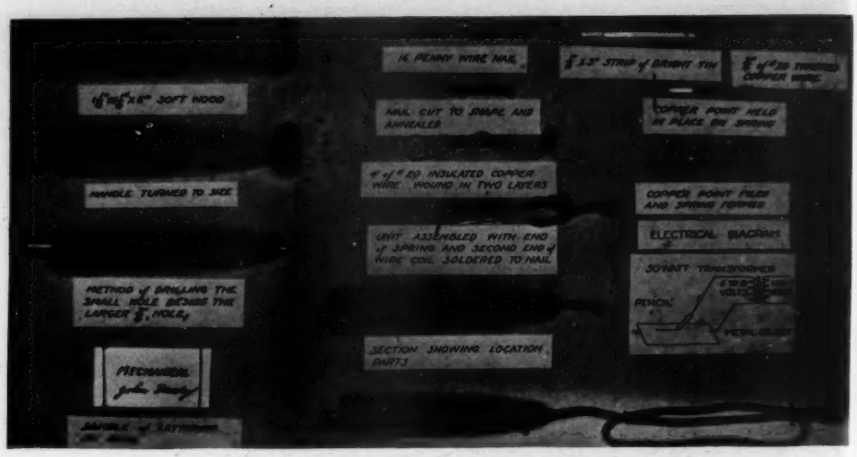

16 PENNY WIRE NAIL
NAIL CUT TO SHAPE AND ANNEALED
COPPER POINT HELD IN PLACE BY SPRING
HANDLE TURNED TO SIZE
UNIT ASSEMBLED WITH END OF SPRING AND SECOND END OF WIRE COIL SOLDERED TO NAIL
ELECTRICAL DIAGRAM
30 WATT TRANSFORMER
SECTION SHOWING LOCATION PARTS

Fig. 5

Yes–No Test for Electrical Pencil

This test is designed to cover the related information that may be made a part of this unit of work.

Directions: Following is a list of questions concerning electricity, some of which should be answered "yes," others should be answered "no." Draw a circle around the answer which you believe to be correct in each case, thus:

Is lightning caused by a discharge of electricity? (Yes) No
Are bar magnets made of aluminum? ..... Yes (No)

1. Is a magnet a substance having the peculiar property of attracting iron and steel to it? Yes No
2. Do all magnets have two poles? ..... Yes No
3. Has an electromagnet the same kind of iron as a permanent magnet? ..... Yes No
4. Is the chief reason for soldering a Western Union splice to make the joint stronger?..... Yes No
5. Does the amperage of a circuit correspond to water pressure in a pipe?..... Yes No
6. Is a bell transformer so called because Alexander Graham Bell made it?..... Yes No
7. Is an electromagnet a device which depends upon electricity for its power?..... Yes No
8. If a horseshoe magnet is heated red hot will it retain its magnetism? ..... Yes No
9. When connecting two dry cells in series, is the center post of one connected to the center post of the others?..... Yes No
10. Does series wiring of two cells double the ampere capacity?. Yes No
11. Is the zinc used in making dry cells? ..... Yes No
12. Is a stranded-wire drop cord more flexible than a solid-wire cord?..... Yes No
13. If a permanent bar magnet is cut in two, will magnetism remain in the two halves?.... Yes No
14. Are compass needles made of brass? ..... Yes No
15. Is No. 20 wire larger in diameter than No. 15?..... Yes No
16. Does an alternating-current transformer change the number of cycles per second?.... Yes No
17. Do like magnetic poles of two permanent magnets attract each other? ..... Yes No
18. Does a bell-ringing transformer change the alternating current to direct current?..... Yes No
19. Are permanent horseshoe magnets made of steel?..... Yes No
20. Is the volt a measure of electrical resistance?..... Yes No
21. When short circuited will a new standard size dry cell cause more than 10 amperes of current to flow?..... Yes No
22. Is the negative terminal of a battery charger connected to the negative post of a storage battery? ..... Yes No
23. If a horseshoe magnet is hung at its center by a string will it assume a north-south position? Yes No
24. Is conductance just the opposite of resistance?..... Yes No
25. Is the negative terminal of a battery charger connected to the negative post of a storage battery? ..... Yes No
26. Should an ammeter be connected in series with the load? ..... Yes No
27. Does vaseline keep storage-battery terminals from corroding? ..... Yes No
28. Do like magnetic poles of two permanent magnets attract each other?..... Yes No
29. For direct current does the carrying capacity of a wire depend more on its surface area than on its cross-sectional area? ..... Yes No
30. If the d.c. terminals of an electromagnet are reversed will the north pole be changed to a south pole?..... Yes No
31. Does a 15-plate storage cell have a higher voltage than a 11 plate? ..... Yes No
32. Does a 1 to 1 transformer raise the voltage?..... Yes No
33. Does a copper wire of large diameter have less resistance than one of smaller diameter, equal lengths considered?.... Yes No
34. Are the electrodes in a dry cell made of zinc and carbon?.... Yes No
35. Is the specific gravity of electrolyte in a fully charged storage battery greater than the specific gravity of one partly charged?..... Yes No

Multiple-Choice Test for Electrical Pencil

This test is designed to cover the related information that may be made a part of this unit of work.

Directions: This is a test to see how much you know about electricity. Several statements and questions follow. Write the number of the correct response to each item in the blank space at the right, thus:

A carpenter drives nails with a (1) mallet, (2) maul, (3) hammer, (4) sledge .....(3)
Which one of these woods is softest? (1) hickory, (2) basswood, (3) oak, (4) black walnut.....(2)

1. Of the four conductors, the best is (1) copper, (2) iron, (3) lead, (4) nichrome .....( )
2. The source of electricity in the bell circuit is (1) the bell, (2) the push-button, (3) the dry cells, (4) the conductors .....( )
3. A permanent magnet is made of (1) steel, (2) iron, (3) copper, (4) cobalt .....( )
4. The usual lamp voltage in our homes is (1) 220 volts, (2) 110 volts, (3) 55 volts, (4) 330 volts.....( )
5. In a simple electric cell, the plates must be (1) zinc and copper, (2) copper and carbon, (3) made of different material, (4) made of the same material .....( )
6. Transformers can be made to operate on (1) direct current, (2) alternating current, (3) current from a storage battery, (4) current from dry cells .....( )
7. The metal having the highest retentivity is (1) copper, (2) iron, (3) steel, (4) silver .....( )
8. The scientist who is generally credited with having discovered induced currents is (1) Edison, (2) Helmholtz, (3) Faraday, (4) Volta.....( )
9. The unit of current is the (1) ampere, (2) volt, (3) watt, (4) ohm.....( )

10. An electromagnet must have a (1) core, (2) relay, (3) secondary winding, (4) binding posts.....( )
11. The volt is the measure of (1) air pressure, (2) current, (3) resistance, (4) potential .....( )
12. If a copper wire and an iron wire were of the same length and cross section, the resistance of the copper wire would be (1) larger, (2) smaller, (3) the same, (4) twice as large....( )
13. To lower the voltage of alternating current, we use a (1) generator, (2) alternator, (3) transformer, (4) motor .....( )
14. Steel is used as (1) transformer cores, (2) laminations in motors, (3) electromagnets, (4) permanent magnets .....( )
15. The frequency of alternating current is (1) the r.p.m. of the rotor, (2) the number of cycles per second, (3) the voltage of the circuit, (4) the current of the circuit.....( )

Completion Test for Electrical Pencil

This test is designed to cover the related information that may be made a part of this unit of work.

Directions: This is a completion test to see how much you know about electricity. Several statements follow in which one or two words have been omitted. Write in the omitted word or words on the solid line at the right-hand side of the sheet, thus:

The center post of a dry cell is made of ..... carbon
A doorbell is connected to dry cells by ..... wires

1. The rubber, cotton, and silk coverings for electrical wires are called? .....
2. Each cell of a storage battery has approximately what voltage pressure? .....
3. What is the voltage of the ordinary city-house lighting circuit? .....
4. How must dry cells be connected so as to increase the ampere capacity? .....
5. What metal is generally used in the manufacture of storage-battery plates? .....
6. What kind of current is used to charge storage batteries?...
7. The metals used in making 50–50 solder are..... and .....
8. Cores of transformers which are built up of thin sheets of iron are said to be.....
9. In a transformer the current travels from the primary winding to the secondary by..
10. The unit of measure of electrical resistance is the.....
11. For a given electrical current the heat developed by a wire depends on its.....
12. What is the instrument called which measures electrical power? .....
13. What is the instrument called which measures amperes?....
14. What kind of current is obtained from a dry cell?....
15. A common device for opening and closing electrical circuits is called a (an).....
16. An electrician ordinarily joins two wires end to end by means of what splice.....
17. The unit of measure of electrical pressure is the.....
18. The acid used in making storage-battery electrolyte is..
19. The capacity of a storage battery is indicated in.....
20. The metal used in making dry-cell containers is.....
21. A device for transforming chemical energy into electrical energy is known as a (an)...
22. A piece of iron or steel which attracts other pieces of iron is called a (an).....
23. Of what substance are arc-lamp electrodes made?.....
24. An electrical device for raising or lowering electrical pressure is called a (an).....
25. What soldering flux should be used for electrical connections where corrosion must be kept at a minimum?.....
26. Any material or medium by which electricity is transmitted is known as a (an).....

PROGRESS REPORT

Eber L. Moore,
Senior High School,
Peru, Indiana

Everyone in educational work and especially secondary education is looking for methods that will develop traits most necessary to help the individual make good on the job. The technical and academic side of the child's instruction has been stressed very emphatically while personality development has been overlooked.

A method by which this side of the student's training undergoes a course of development along with his technical and academic training has been worked out and used with great success in the industrial classes of Peru Indiana High School.

In this method the student keeps check on his daily actions endeavoring to control himself on the things that are going to mean success or failure to him on the job.

This is carried out by a *progress chart* where his daily class life is recorded. It is before him at all times and keeps him informed of the rewards that come from a good record.

At the beginning of the term the pupil is listed by letter or number in the column *accepted*.

For each day that the student fails to make himself guilty of any of the 8 causes of failures listed, he gets a progress mark. On those days when he is guilty of one or more of these causes, their respective numbers are entered instead of a progress mark.

His standing is determined by the position he has reached at the end of the term. A supplementary mark is given based on his finishing position, and added to or subtracted from his regular class grade.

As the chart shows, he may end the period in one of seven positions.

Topnotcher I. Went through without any delay checks, which means 10 points added to his grade.

Topnotcher II. Has had checks removed. Means 5 points added to his grade.

Questionable. One delay check not removed. He receives same as his class grade.

Not Satisfactory. Two delay checks not removed. Five points are deducted from his grade.

Losing Out. Four delay checks not removed. Ten points are deducted from his grade.

Demoted. Six delay checks not removed. Fifteen points are deducted from his grade.

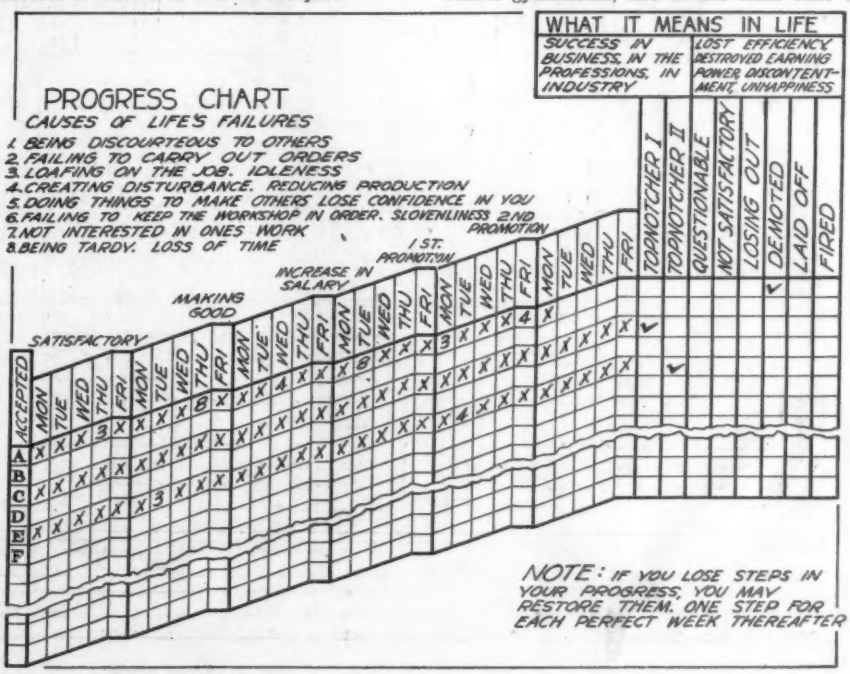
Laid Off. Eight delay checks not removed. Twenty points are deducted from his grade.

Fired. Ten delay checks not removed. Denotes complete failure.

ALL-ELECTRIC SCORE BOARD FOR BASKETBALL

John J. Grosz,
Adams, Massachusetts

A basketball score- and time board which is unique in design, simple in operation, and easily built by the industrial-arts department from odds and ends found in the workshop, may add materially to the appearance of the school gymnasium, and at the same time be


WHAT IT MEANS IN LIFE
SUCCESS IN BUSINESS, IN THE PROFESSIONS, IN INDUSTRY
LOST EFFICIENCY, DESTROYED EARNING POWER, DISCONTENTMENT, UNHAPPINESS
PROGRESS CHART
CAUSES OF LIFE'S FAILURES
1. BEING DISCOURTEOUS TO OTHERS
2. FAILING TO CARRY OUT ORDERS
3. LOAFING ON THE JOB. IDLENESS
4. CREATING DISTURBANCE. REDUCING PRODUCTION
5. DOING THINGS TO MAKE OTHERS LOSE CONFIDENCE IN YOU
6. FAILING TO KEEP THE WORKSHOP IN ORDER. SLOVENLINESS 2. NOT INTERESTED IN ONES WORK
7. NOT INTERESTED IN ONES WORK
8. BEING TARDY. LOSS OF TIME
1ST. PROMOTION
INCREASE IN SALARY
MAKING GOOD
SATISFACTORY
ACCEPTED
TOPNOTCHER I
TOPNOTCHER II
QUESTIONABLE
NOT SATISFACTORY
LOSING OUT
DEMOTED
LAID OFF
FIRED
NOTE: IF YOU LOSE STEPS IN YOUR PROGRESS, YOU MAY RESTORE THEM. ONE STEP FOR EACH PERFECT WEEK THEREAFTER

a credit to the school's team. Unlike other scoring devices, this board contains no mechanically operated moving parts which from time to time become worn out and then must be replaced. Instead, all number formations are made by various electric-light combinations. All changes in the score, time, quarter, etc., are made by an operator seated at a control box, the box being located on the officials' table. The timer or scorer can conveniently assume the role of operator as shown in Figure 1.

The entire assemblage consists of three main parts: the board proper, the control box, and the cable connecting the board to the control box. The discussion of these individual units will be taken in the order indicated above.

Fig. 1. The official timer or scorer can conveniently assume the role of operator of the score board

The Board Proper

The board proper consists of three pieces of plywood each 3 by 5 ft. held together by a framework of ¾-in. softwood of almost any variety. The piece of plywood which forms the front of the board is drilled in such a manner as to accommodate 134 light sockets, these holes being drilled with centers and diameters as shown in Figures 2, 3, and 4. The holes are drilled with an extension bit of 5/16-in. radius, or of such a diameter as will admit a standard electric-light socket. The holes are drilled so as to form four blocks of holes, consisting of thirty holes per block. One of these blocks represents the units' digit and the other the ten's digit in the *opponent* score, the same being true for the *home-team* score. In each block of lights it is possible

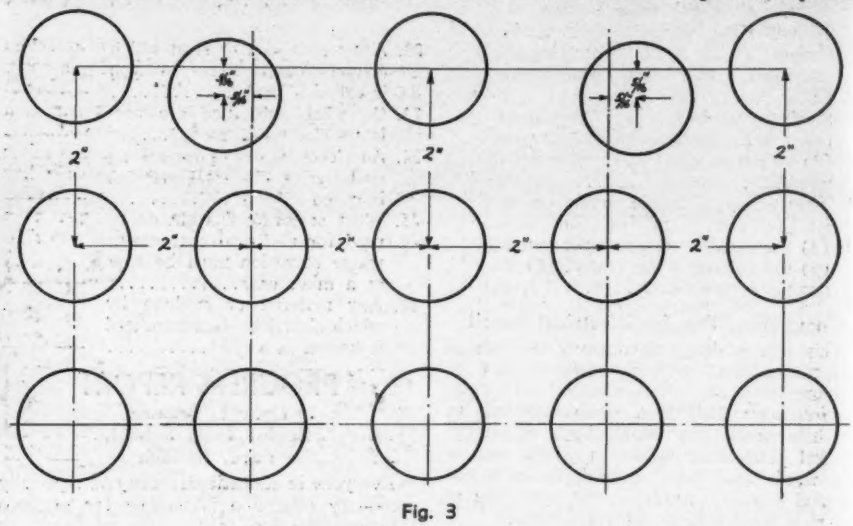


Fig. 3

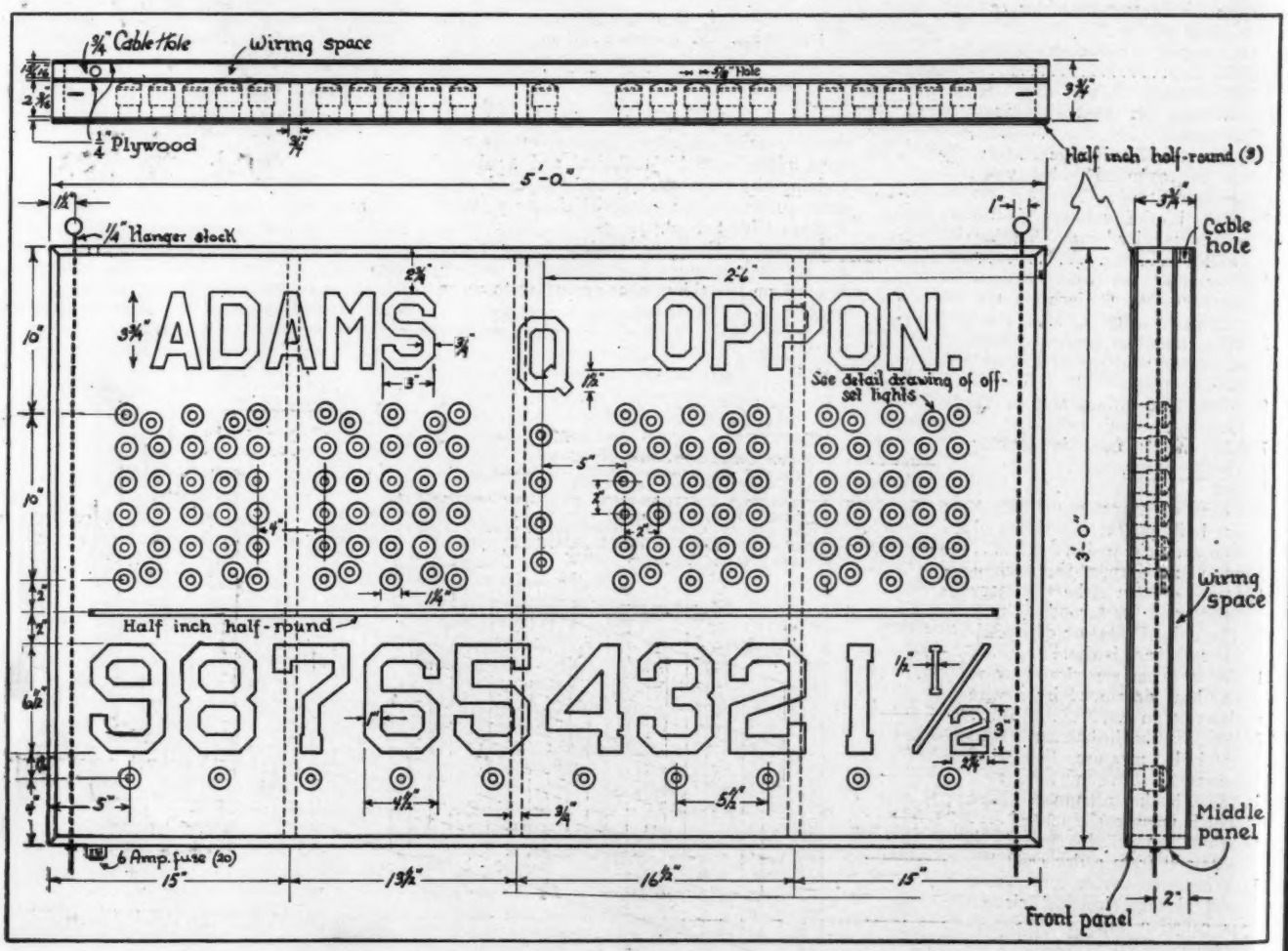


Fig. 2. Board proper

to form any number from 0 to 9, therefore, the board can conveniently indicate any score, or combination of numbers, from 00–00 to 99–99. The four lights in the center of the board, under *Q*, represent the quarters of the game. The lights at the bottom of the board under the numbers (from 9 to ½) are used to indicate the number of minutes left to play. That is, if the light under number *3* is lighted, as shown in Figure 5, there are but three minutes left to play.

After having completely drilled the panel forming the front of the board it is well to stain and varnish it immediately, as it is difficult to apply stain and varnish around the many sockets after the whole board has been assembled. Such a procedure also removes the possibility of getting stain and varnish into the sockets, thereby eliminating the danger of poor contacts and other hazards that may arise.

The middle panel of plywood is drilled with exactly the same centers as is the one for the front of the board, the only difference being the hole diameter, this panel being drilled with a 5/8-in. bit to accommodate the end of the socket through which the wires enter. Essentially, the purpose of these two pieces of plywood is to keep the light sockets in place. The hole centers in each of the four blocks for both the middle and front panels are two inches apart, except for the offset lights, the dimensioning of which may be seen in the detail shown in Figure 3. The offset spacing of the several lights provides for a smooth top and bottom curve on such number formations as the 3, 6, 8, 9, 0, and a few others.

The piece of plywood forming the back of the board merely covers the space where all the wiring of the sockets is done and thereby excludes any dust or moisture which might cause trouble. It has been found extremely convenient to apply the front and middle panels in four sections, the piecing being done

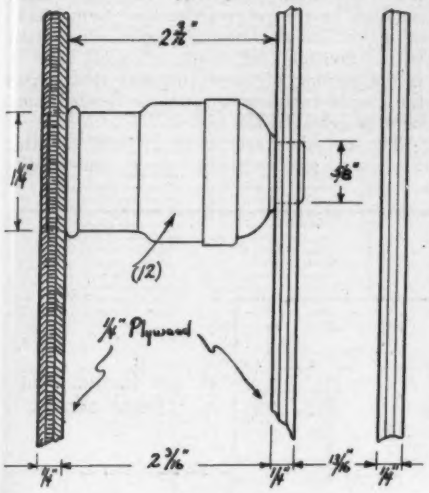


Fig. 4

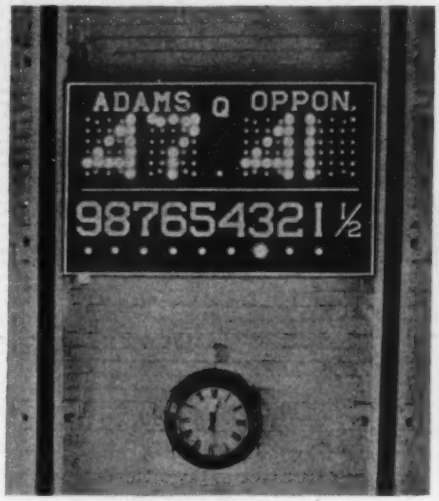


Fig. 5. In each block of lights it is possible to form any number from 0 to 9

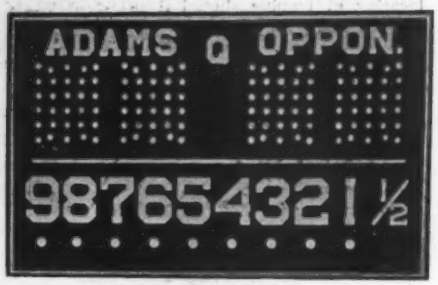


Fig. 6. The enameled letters and numbers against a dark-walnut stained background present a striking appearance

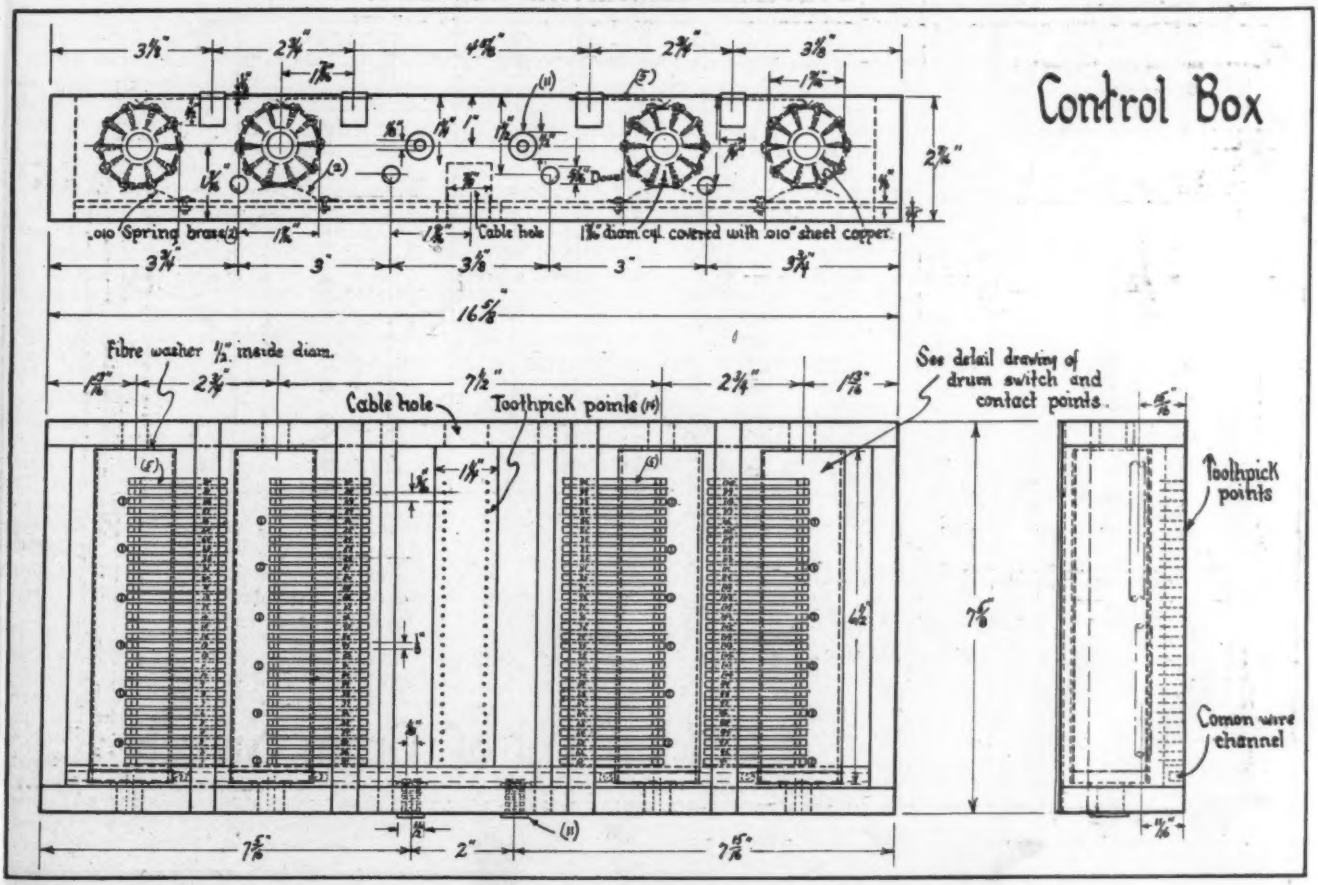


Fig. 7

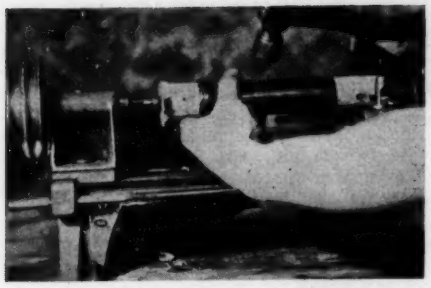


Fig. 8. The sheet-copper is fastened to the wooden core as an initial step in making the drum switches

on the framework between the blocks as shown in Figure 2. This procedure is suggested to minimize work and confusion in the locating of trouble should it occur in either of the blocks of lights. By applying the panels in one piece it would be necessary to remove the entire front or middle panels to locate loose connections or to localize trouble in any particular block of lights. By piecing as suggested, only the paneling over the defective block would have to be removed when difficulties occur.

The numbers and letters on the board are all cut from scraps of plywood or other quarter-inch wood, and painted before being nailed to the board. Along the outer edges, and separating the score from the time, a piece of ½-in. half round is fastened merely for decoration and appearance. The letters, numbers, and half round, painted with white enamel, and fastened against a dark walnut-stained background, present a very striking and pleasing appearance. See Figure 6.

The board is hung by means of two quarter-inch rods each threaded at one end, with one-inch eyes at the opposite ends. Cut the threads a little longer on the rods to allow freedom in leveling the board.

The Control Box

The control box, Figure 7, though much smaller than the board proper, involves many more intricate operations in its construction. The control box consists chiefly of four screw-studded cylinders which act as drum switches; four banks of contact points; and four pieces of doweling which are saw-niched to act as guides for the cable wires when being connected to the proper contact points. It will be noticed that there are four drum switches in the control box and four blocks of lights on the board proper. One drum switch controls one block of lights, and it is the turning of these cylinders that makes the proper contacts to form the desired numbers in lights on the board.

The cylinders are made by first selecting a piece of relatively hard wood, and turning

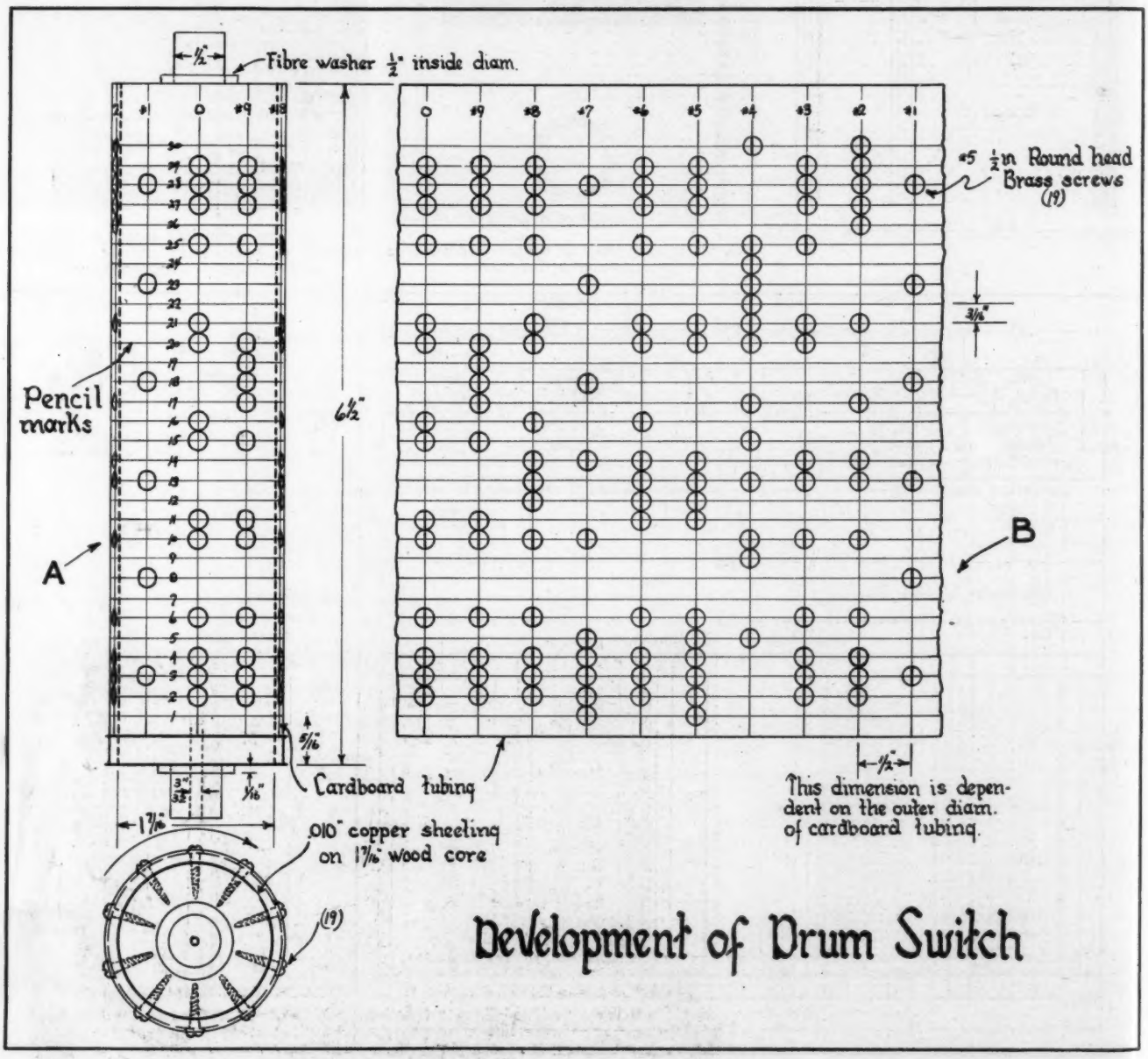


Fig. 9

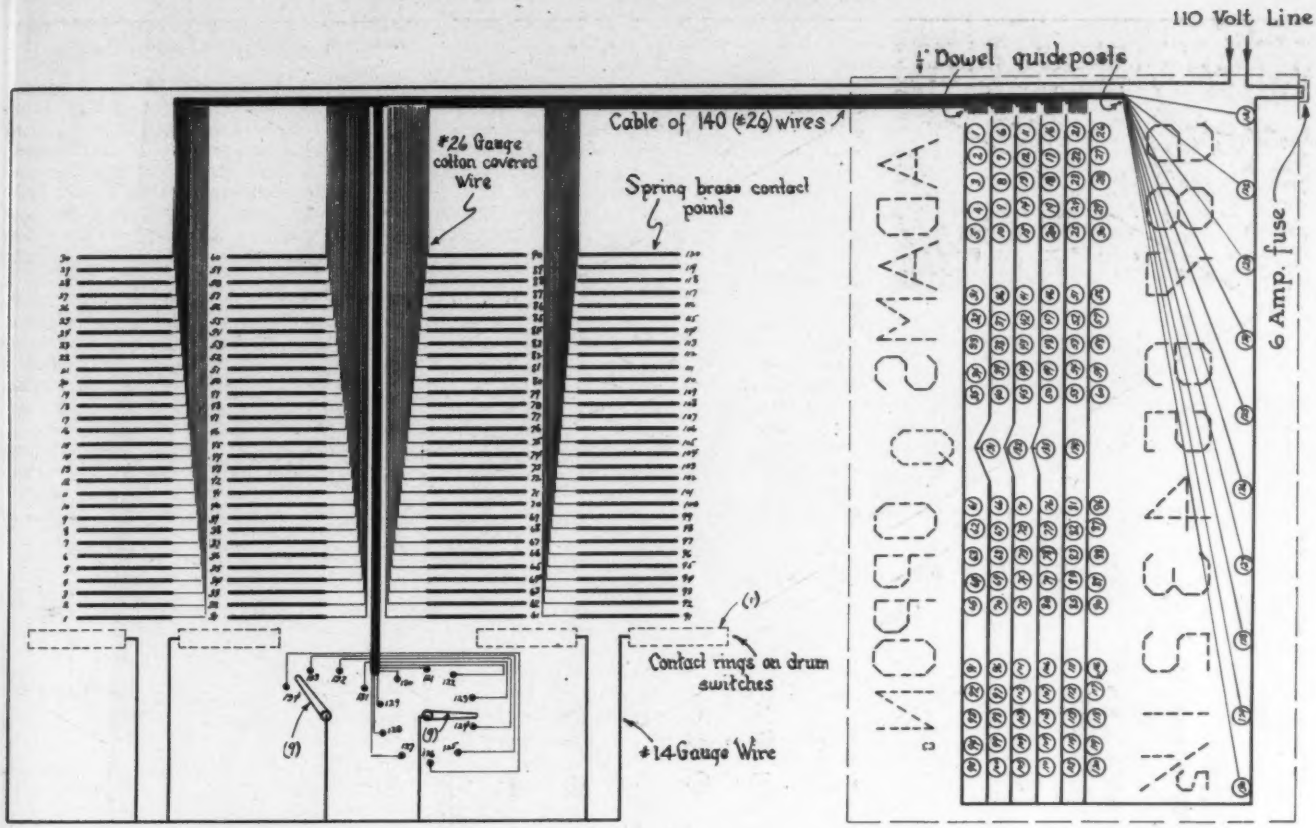


Fig. 10

it in the lathe to a diameter of 1 7/16 in. over a distance of approximately 8 in. After this piece of wood has been turned to the proper diameter, it is covered with a piece of sheet copper (.010 in. in thickness) measuring 6 by 8 in. as shown in Figure 8. Before applying the copper sheeting it should be cut to a depth of about ⅛ in. (these cuts to be about one eighth of an inch apart) along the 6-in. edge as shown at 15, Figure 13. It is well to have the copper sheeting of such dimensions that it will fit exactly, rather than overlap, as overlapping of the sheeting may be the cause of the cylinder losing its roundness. A brass ring, turned from a piece of 1½-in. brass tubing is then slipped over the copper sheeting to within ⅛ in. from the frilled end as shown in Figure 8. A piece of cardboard tubing 8 in. in length with an inside diameter of 1½ in., or of such diameter as will provide for a snug fit is then slipped over the copper sheeting. The cardboard tubing should be cut so as to fit snugly against the side of the ring. With the tubing held firmly against the ring, the frilled edges are turned up against the other side of the ring and then securely soldered. This provides for good contact, and at the same time keeps the ring from slipping from the copper sheeting.

With the cylinder still in the lathe, replace the cutting tool with a pencil, and 5/16 in. from the outer edge (the frilled edge), set the pencil so as to mark the cylinder through its entire circumference, Figure 9. Repeat this operation until thirty such circumference marks have been drawn on the cylinder, spaced at 3/16-in. intervals. These circumferences should be numbered successively from 1 to 30, as shown at A, Figure 9, the one closest to the brass ring being number 1. The circumference of the tubing should now be divided into ten even spaces, the spacing depending, of course, on the outer diameter of the tubing. Lines should be drawn through these markings parallel to the longitudinal axis of the cylinder. These lines should be marked from 0 to 9 as shown at B in Figure 9. These markings indicate the number that will be formed when the screwheads on that particular line come in contact with the contact points. For instance, under the longitudinal line No. 7, we find screwheads at circumferential lines 28, 23, 18, 14, 10, 5, 4, 3, 2, and 1. In other words, contact at the screwheads as listed above are necessary to form the 7 in lights. At B in Figure 9 is shown a complete development of the number combinations. A No. 5 by ½-in. roundhead brass screw should be turned into the wood at every intersection of lines designated by the small circles shown.

Flatheaded screws might just as well be used as roundhead, the only requirement being that they (and all other metal parts, as far as possible) should be made of brass in order to prevent rusting. When all the screws have been driven into their proper places the drum switches are ready to be cut to the proper lengths of 6½ in. Projections of ½ in. in diameter and 9/16 in. in length should be provided for at both ends of the cylinders,

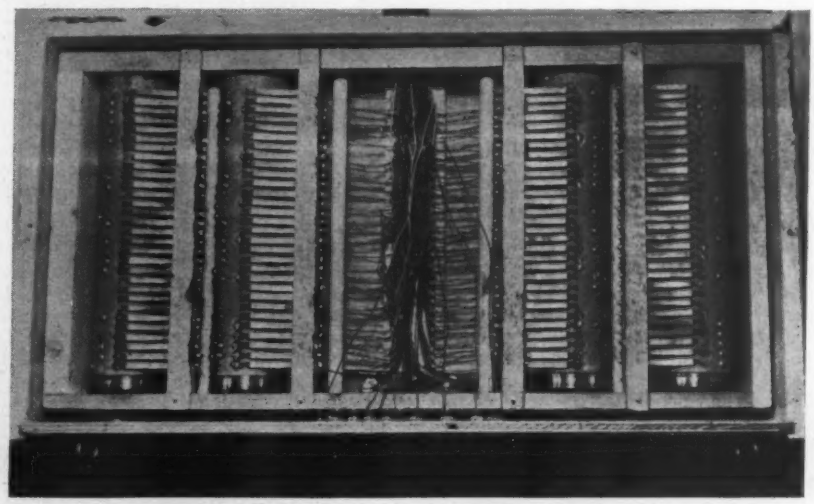


Fig. 11. The control box when completed is placed into the control box case

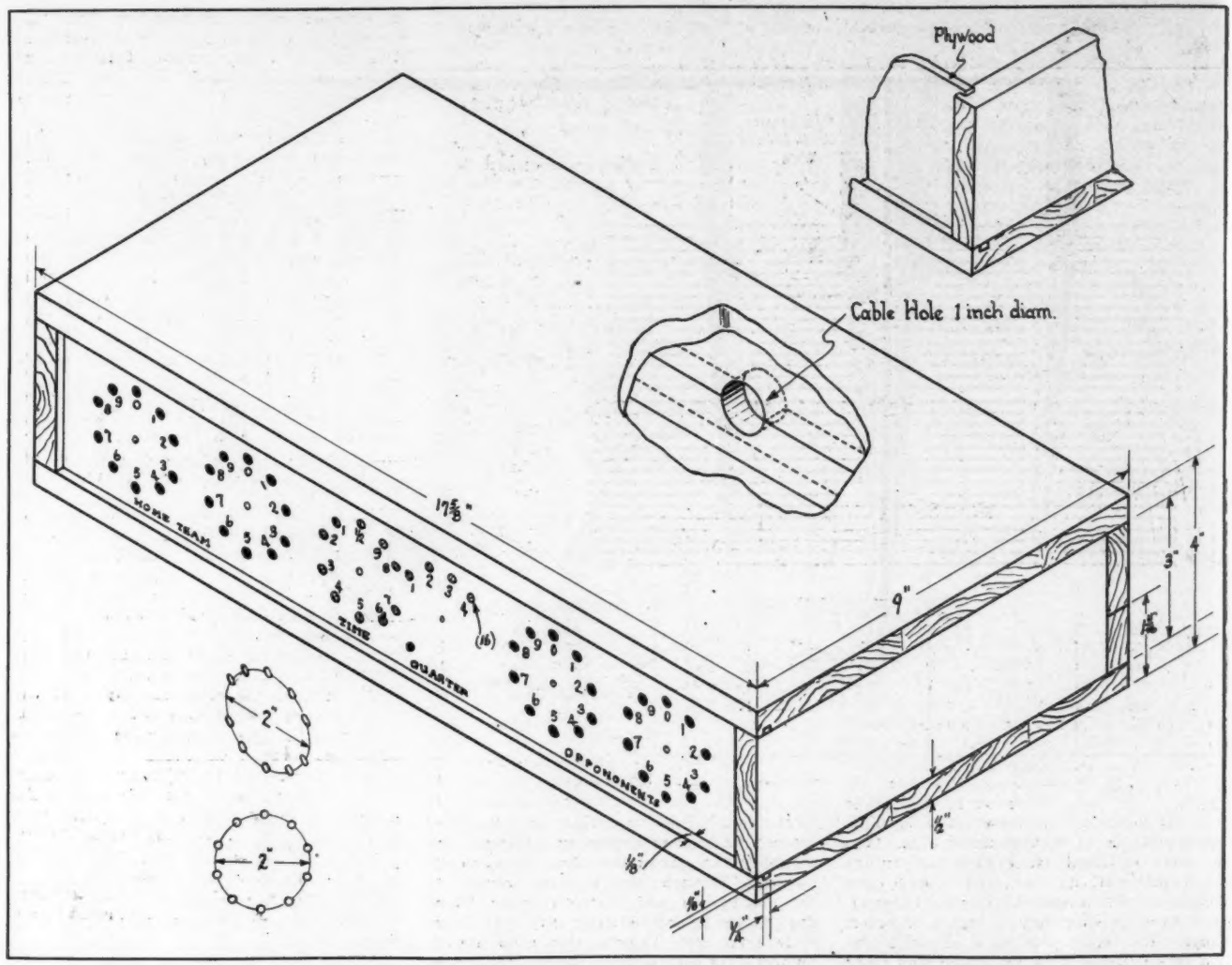


Fig. 12. Control box case

as these wooden plugs serve as centers upon which the drum switches rotate. The projection on the ringed end should be drilled with a 3/32-in. drill in order that a turning knob may be screwed into the wood. Because of the hardwood used to make the cylindrical switch, the knob screw should thread itself into the hole with little or no difficulty, and if drilled with the proper drill diameter, it should fit tight enough so that the cylinder can be turned in either a clockwise or counterclockwise direction without becoming loose.

The contact strips are made of .010-in. spring brass. They should be so constructed that they will provide for a very small contact area. The contact points are made by bending the strips of metal as shown at 5 in Figure 13. When mounting the strips it is well to fasten them by nailing to a rather soft piece of wood. It will be found that staggering the nails, rather than placing them in a line, will avoid splitting the piece of wood to which the strips are fastened. With the nails placed so near together as is required here, especially when nailed in a row, it will be found that splitting of the wood is almost unavoidable. After the contact strips have been properly nailed and spaced, a cap of softwood ⅛ in. in thickness is glued over the piece of wood holding the brass strips and then placed in the wood vise for proper drying under pressure.

The four pieces of doweling, shown at 17 in Figure 13, are used in the construction of the control box, to serve as guides in holding the wires firmly when being directed from the cable to the proper contact point. The piece of wood in the center of the control box, Figure 14, also helps to guide the wires to their proper places. The toothpick points, driven into the drilled wood, serve as guide posts and prevent the wires from becoming entangled with one another. When the control box has been completely wired, it should be placed into the control-box case as shown by Figure 12. The case should be stained and finished in harmony with the board proper.

The Cable

The cable connecting the control box and the board consists of 140, No. 26 gauge, cotton-covered wires, obtainable from the field coils of an old generator or motor. In reality only 134 of these wires are used, but it is well to include a few extra wires in case of a *leak* or two in the cable. There can be no short circuit in the cable for it is unipolar and the current is traveling in the same direction, and should one wire touch another, it simply would cause an unwanted light to burn on the board. This, of course, is undesirable, for any extra lights in the formation of a particular number would render it more or less illegible and somewhat distorted.

The length of the cable depends entirely upon the location of the board and control box and the distance between them. Because of the many and varying conditions under which scoreboard installations might be made, it is impossible to give explicit directions as to proper installation and length of cable. An allowance of 8 ft. of extra cable length should be made for the wiring of the board and control box — 2 ft. for the control box and 6 ft. for the board.

After a definite length of cable has been decided upon, the individual wires comprising the cable are strung — one at a time — between two supports where they are held securely until the 140 wires have been strung. Every possible precaution should be taken at this point to see that the insulation is neither broken nor scraped from the wires. For ease of identification when wiring the board and control box, it is well to number each wire at both ends with a small piece of cardboard upon which has been written the desired number. The wires should be numbered successively from 1 to 140. After the wires have been strung and correctly numbered they should hang loosely between the two supports. In order to prevent a possible *leakage* in the cable, the wires, while loosely hung between the supports, should be treated with a Gen-

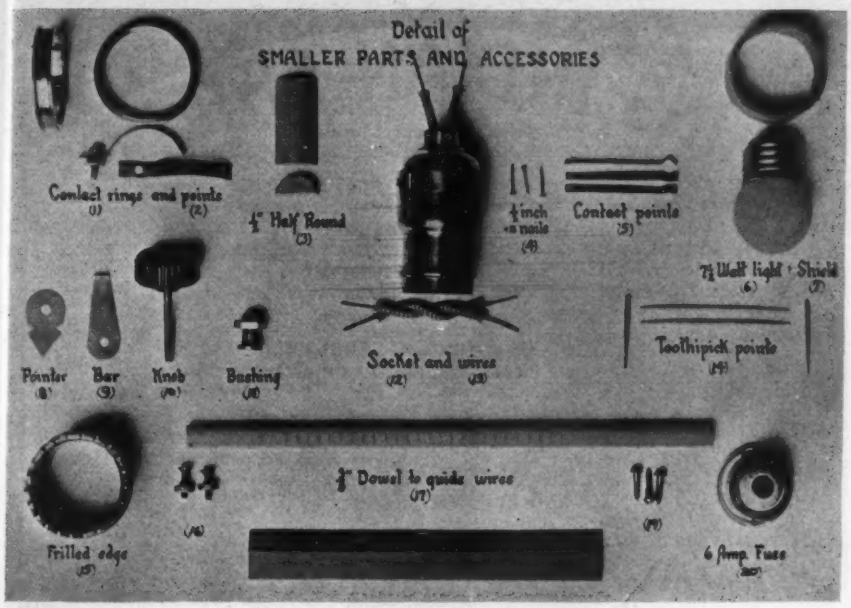


Fig. 13. Smaller parts

eral Electric insulating product known as Glyptal. This product, when applied with an ordinary paint brush, serves as a very good insulating agent and when dry retains its pliable properties. Varnish may conveniently be substituted for the Glyptal without seriously impairing the insulating properties, but varnish has a tendency to become hard and brittle when dry, and as a result would render the cable rather stiff and unmanageable. Immediately after the Glyptal has been applied, the wires, while still tacky from the insulating material, should be bound together in cable form. This is done by winding the wires, in a spiral fashion, with a spool of stout thread, and then again treating with the insulating material. After the Glyptal has dried thoroughly, the cable should be covered in order to exclude all moisture, foreign matter, and possible injuries to any of the individual wires. To cover the cable, it should be wound spirally with either friction or linen tape, and then shellacked. To the cable, over its entire length, a piece of insulated No. 14 gauge wire is fastened (with stout thread or twine). This piece of No. 14 gauge wire acts as the common wire as shown in the wiring diagram, Figure 10. The No. 14 gauge copper wire might well be worked into the cable, but the laws of many states governing electrical wiring, prohibit such a procedure, and therefore it is advisable to merely fasten it to the cable with thread or twine. The control box, board proper, and cable are now ready for the process of wiring.

Wiring

A hasty glance at the wiring diagram with its maze of tiny wires, Figures 10 and 11, may provide temporary discouragement for anyone who has done but little electrical work, but a further investigation will disclose that in reality it is all very simple and logical in purpose. The whole wiring system consists of the control box with 134 wire connections, and the scoreboard with the same number of connections for the lights. The cable simply connects a contact point in the control box to a correspondingly numbered light in the board proper. For example, one end of Cable Wire No. 26 is connected to contact point No. 26 in the control box, while the other end of wire No. 26 is connected to light No. 26 on the board.

Preliminary wiring of the sockets should be done before the light sockets are placed between the front and middle panels. Well-insulated, twisted fixture wire is suitable for this purpose as it is very pliable and easy to handle. To wire the sockets cut 268 pieces of wire, approximately three inches in length, and after scraping about one half inch of insulation from each end, the wires are ready for servicing. After the wires have been connected into the sockets, it will be seen that about an inch of wire protrudes from the ends of the sockets. It is to this inch projection of wire in each socket that all cable connections are made.

When the board has been assembled to the point where the wiring is the next logical procedure, one wire in each socket should be connected to a common wire as shown in the Wiring Diagram, Figure 10. The other wire of each socket should be connected to its correspondingly numbered wire in the cable. All wire connections should be properly soldered in order to prevent the possibility of poor connections. The remainder of the wiring in the control box, that is, the wiring of the *quarter control* and *time control* is done as is shown in Figure 10.

Figure 13 shows the smaller parts that are used in the construction of the scoreboard. The numbers in parentheses correspond to the similar numbers on the various diagrams, indicating the relative positions of each of the small parts.

The board is now ready for the insertion of the lights. These lights are of the 110-volt, 7½-watt variety, and are obtainable from any electric appliance dealer or any 5- and 10-cent store. When the bulbs have been inserted they should be shielded in order to avoid the diffusion of light from one bulb to another. This is done by cutting on the circular saw pieces of cardboard tubing (the diameter of which is the same as the bulb) approximately one inch in length and slipping same over bulbs. The pieces of tubing should be stained to match the color of the board.

After the board has been properly installed, it will be found that it not only adds to the appearance of the gymnasium, but also adds to the enjoyment of the fans and spectators. This type of scoreboard may also be used for other sports besides basketball. Thus it has been used in track meets, boxing, wrestling matches, and other activities conducted in the gymnasium.

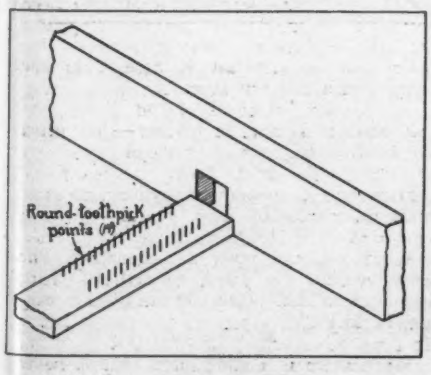


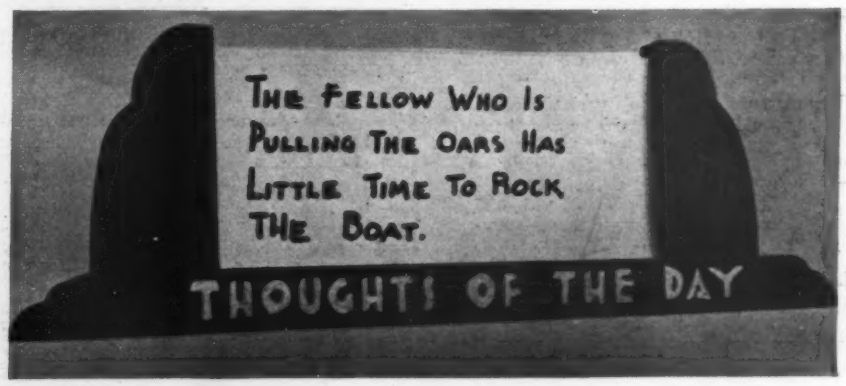
Fig. 14

THOUGHTS FOR THE DAY

Lewis H. Hodges,
Grand Haven, Michigan

From a collection of concentrated bits of philosophy that have been gathered over the years, the following have been selected as particularly worth while.

These mottoes are changed daily by a student who takes the old one out of the rack shown by the illustration and replaces it with a new one. The rack is placed on top of the time-card container so that every student sees the motto when he checks in and out.



The rack or holder is made of walnut and is 22 in. long over all. The base is 3 in. wide, made out of 1½-in. stock. The uprights are made of 1-in. material, 6 in. high. The cards themselves are 13½ in. long and drop down into ½-in. kerfs in each upright piece. Of course, any of these dimensions may be changed to suit the user.

The words "Thoughts of the Day" are cut out of quarter-inch material, in this case, fir veneer, and applied to the base.

Mottoes

Push, pep, and *pugnacity* eternally defeat *bluff, bluster,* and *bunk.*

* * * *

A prudent question is one half of wisdom. — *Bacon.*

* * * *

It is better to wear out than to rust out. — *Cumberland.*

* * * *

A man is not paid for having brains, but is well paid for using them.

* * * *

Man — Without tools he is nothing — With tools he is all. — *Thomas Carlyle.*

* * * *

The world makes way for the determined man.

* * * *

Industry is a way to make a life.

* * * *

Men who have much to say use the fewest words. — *H. W. Shaw.*

* * * *

Machine tools are not only the basic machines of industry but they are the only machines which perpetuate themselves.

* * * *

Enthusiasm is the breath of genius. — *Beaconsfield.*

* * * *

Little minds are tamed and subdued by misfortunes, but great minds rise above them. — *Washington Irving.*

* * * *

The man who wastes today lamenting yesterday, will waste tomorrow lamenting today.

* * * *

The right kind of thinking has no boundary lines. — *Watson.*

* * * *

Fools wait for things to turn up; wise men go and turn them up.

* * * *

The fellow who is pulling the oars has little time to rock the boat.

* * * *

The clever fellow does not always win. The plugger, aiming for a definite goal, often passes him in the race.

* * * *

They can who think they can.

* * * *

The measure of a man's real character is what he would do if he knew he would never be found out. — *MacCauley.*

* * * *

In killing time, see to it that you do not murder opportunity.

* * * *

Anyway, the fellow with his nose to the grindstone isn't sticking it in somebody else's business.

* * * *

When a true genius appears in the world, you may know him by this sign — that the dunces are all in confederacy against him. — *Jonathan Swift.*

* * * *

The fellow who flies with the owls at night can't keep up with the eagles during the day.

* * * *

A good way of relieving the monotony of your job is to think up ways of improving it.

* * * *

Life if like a bicycle — stop pedaling and you fall off.

* * * *

When you play, play hard. When you work, don't play at all.

* * * *

Constructive criticism is a kick in the pants with a soft felt shoe.

* * * *

Experience is a good teacher — but often she keeps us too long after school.

* * * *

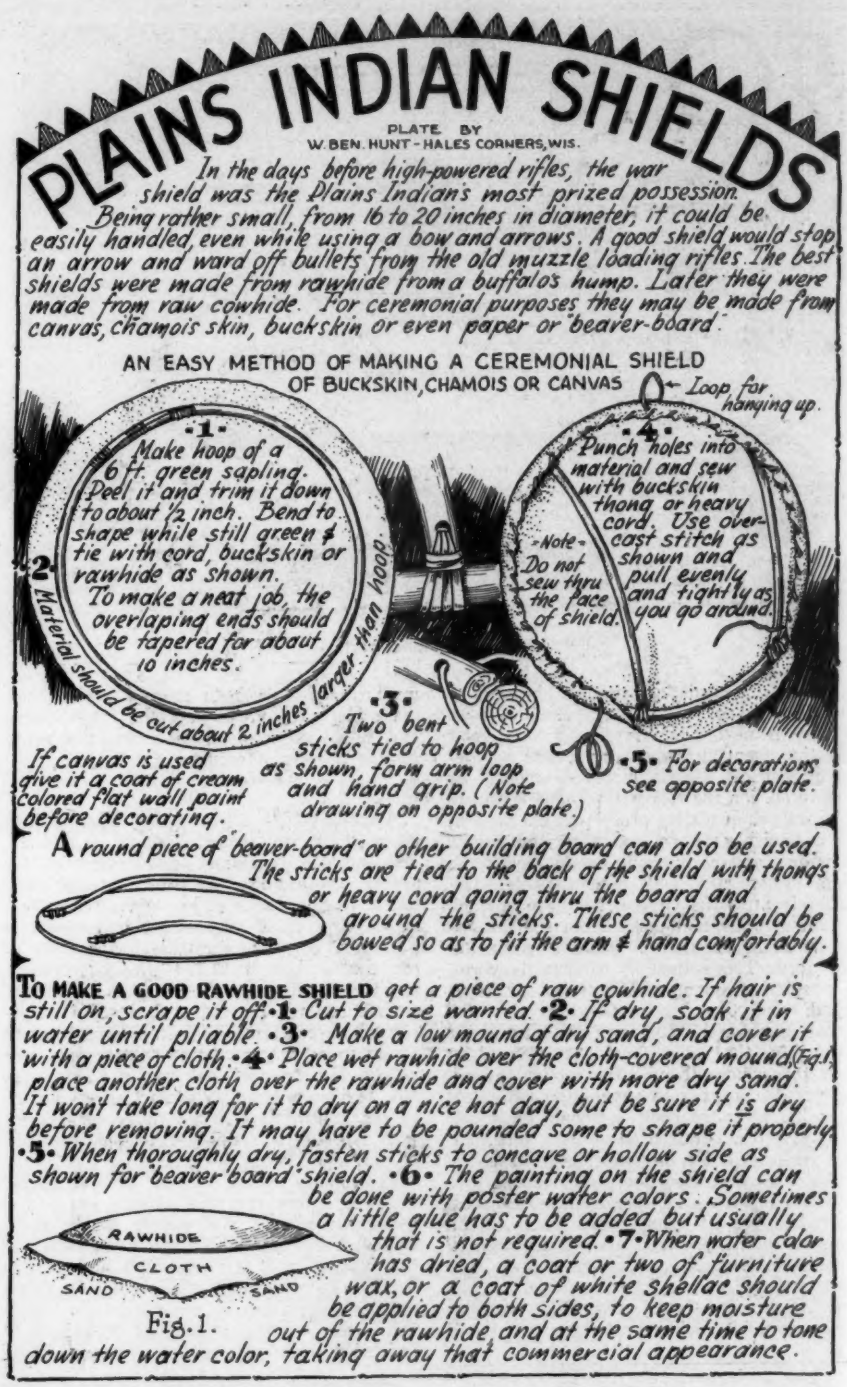
If we hope to amount to anything, we must break away from the herd.

* * * *

When you call upon a thoroughbred, he gives you all the speed, strength of heart, and sinew in him. When you call upon a jackass, he kicks.

* * * *

When there is a ghost of a chance, never give up until you give up the ghost.


PLAINS INDIAN SHIELDS
PLATE BY
W. BEN. HUNT - HALES CORNERS, WIS.
In the days before high-powered rifles, the war shield was the Plains Indian's most prized possession. Being rather small, from 16 to 20 inches in diameter, it could be easily handled even while using a bow and arrows. A good shield would stop an arrow and ward off bullets from the old muzzle loading rifles. The best shields were made from rawhide from a buffalo's hump. Later they were made from raw cowhide. For ceremonial purposes they may be made from canvas, chamois skin, buckskin or even paper or beaver-board.
AN EASY METHOD OF MAKING A CEREMONIAL SHIELD OF BUCKSKIN, CHAMOIS OR CANVAS
Loop for hanging up.
•1• Make hoop of a 6 ft. green sapling. Peel it and trim it down to about ½ inch. Bend to shape while still green & tie with cord, buckskin or rawhide as shown. To make a neat job, the overlaping ends should be tapered for about 10 inches.
•2• Material should be cut about 2 inches larger than hoop.
•3• Two bent sticks tied to hoop as shown, form arm loop and hand grip. (Note drawing on opposite plate.)
•4• Punch holes into material and sew with buckskin thong or heavy cord. Use over-cast stitch as shown and pull evenly and tightly as you go around.
-Note- Do not sew thru the face of shield.
•5• For decorations see opposite plate.
If canvas is used give it a coat of cream colored flat wall paint before decorating.
A round piece of "beaver-board" or other building board can also be used. The sticks are tied to the back of the shield with thongs or heavy cord going thru the board and around the sticks. These sticks should be bowed so as to fit the arm & hand comfortably.
TO MAKE A GOOD RAWHIDE SHIELD get a piece of raw cowhide. If hair is still on, scrape it off. •1• Cut to size wanted. •2• If dry, soak it in water until pliable. •3• Make a low mound of dry sand, and cover it with a piece of cloth. •4• Place wet rawhide over the cloth-covered mound (Fig. 1) place another cloth over the rawhide and cover with more dry sand. It won't take long for it to dry on a nice hot day, but be sure it is dry before removing. It may have to be pounded some to shape it properly. •5• When thoroughly dry, fasten sticks to concave or hollow side as shown for "beaver board" shield. •6• The painting on the shield can be done with poster water colors. Sometimes a little glue has to be added but usually that is not required. •7• When water color has dried, a coat or two of furniture wax, or a coat of white shellac should be applied to both sides, to keep moisture out of the rawhide, and at the same time to tone down the water color, taking away that commercial appearance.
RAWHIDE
CLOTH
SAND
SAND
Fig. 1.

How the shield is held in battle.
HOW SOME SHIELDS WERE DECORATED
On this page are shown 3 attractive shields such as were made and used by the Plains Indians. Painted and decorated in this manner, any 16 inch disk, if only of paper stretched over a narrow hoop, will make a striking decoration for club room or den. Of course, if the shield is made of rawhide it will be more realistic, but no more attractive.
If oil paint is used, try and get flat paint. Glossy paint spoils the effect.
The Indian's shield was his "medicine". It protected him from harm and gave him wonderful powers. It was supposed to terrify his enemies and had mysterious qualities which only the owner knew about. The painting and the objects tied to the shield, all had their special meanings and qualities which were in turn imparted to the owner of the shield.
Owl feathers and fluffs.
Red
Blue
White
Bear claws tied on with thongs.
Eagle feathers and a piece of red flannel.
Owl feathers
Reddish brown
Blue
Blue
Red
Red
White eagle feathers were always used when on hand, still other feathers were valued for their significance. The owl feather meant sight at night. The crow has wonderful sight in the daytime. So don't be afraid to use your imagination, and don't be afraid to make changes in the designs shown here
The red flannel on the two lower shields goes around the back as far as it does in front, and is fastened by tying as shown
Punch holes for tying.
Yellow
Small turtle shell
see it?
Very few shields are found today outside of museums and private collections, and a good one is practically priceless.

When a man has a reputation for the truth, he doesn't have to say he can prove a thing.

* * * *

What you do tomorrow will never make up for what you lost today.

* * * *

Those who want to rise in this world must stoop, because all climbers have to bend.

* * * *

The man who gets along in life is the one who can look happy when he isn't.

* * * *

Tact is the act of making the other fellow feel more important than he is.

* * * *

The most important principle of individual conduct is the golden rule.

* * * *

Noah didn't wait for his ship to come in — he built one.

* * * *

You can be popular without making a fool of yourself.

* * * *

A young man without great purpose is about as valuable as a billiard ball with a flat side.

* * * *

Discretion is not so much indicated by never making a mistake as by never repeating it. — *Bovee.*

Our biggest hit in life is never made by knocking others.

* * * *

Perfection consists not in doing extraordinary things but in doing things extraordinarily well.

* * * *

He who would have nothing to do with thorns must never attempt to gather any flowers.

* * * *

The only difference between stumbling blocks and steppingstones is in the way you use them.

* * * *

The waiter said that the wurst was yet to come.

* * * *

"Patience," says Rousseau, "is bitter, but its fruit is sweet."

* * * *

Theodore Roosevelt said: "The only man who never makes a mistake is the man who never does anything."

* * * *

Character is made by what you stand for; reputation, by what you fall for. — *Robert Quillan.*

* * * *

Honesty always pays in the long run — but a few people seem to be rather short winded.

* * * *

The hardest job of all is that of finding a soft job.

* * * *

Don't be afraid of wasting time by learning something you are not required to know.

* * * *

A physician says that success depends upon the functioning of the glands. The sweat glands?

* * * *

One minute of carelessness may mean months of sorrow.

* * * *

Good housekeeping produces *safety.*

* * * *

The best *safety* device in the world is just a few inches above your shoulders!

* * * *

He who works the *safest* way lives to work another day.

* * * *

Try *horse sense* not *horse play.*

* * * *

Think! That is the best way to prevent accidents.

* * * *

The man who is interested in his *job* is interested in *safety.*

* * * *

Leave nonstop flights to aviators; walk down stairs.

* * * *

Make *safety* a *habit* not just a slogan.

* * * *

To be a success you must
First, be a man.
Next, have a plan;
Then, never say can't
But always say — can.
— *C. W. Kirsch*

* * * *

Prosperity is contingent upon our own hard work, our own honest efforts, our own production, and our own consumption. — *C. W. Kirsch.*

* * * *

People who think straight don't run around in circles. — *Bertram.*

Many a man has bowed his head and left the dock just before his boat came in. — *W. M. Brownell.*

* * * *

Many a man gets a pretty hard fall from being thrown on his own resources.

* * * *

You can never win the heavyweight title by doing lightweight stunts.

* * * *

When a man is wrapped up in himself the package is usually pretty small.

* * * *

Man is worth 98c on the hoof; anything additional is up to the man.

* * * *

Anything *almost* right is wrong.

* * * *

A place for everything, and everything in its place.

* * * *

The work is done — done well — bring me my horse. — *George Washington.*

* * * *

Time is money; don't waste your money.

* * * *

A man may be worth two dollars a day from his neck down, but from his neck up — well, that's up to him.

* * * *

Consider the hammer — it does not lose its head, it does not fly off the handle.

* * * *

An ounce of honey will attract more flies than a gallon of gall. — *Lincoln.*

* * * *

Let your head save your heels.

* * * *

Choose your bailwick with care. Make up your mind whether you are a big-time bird or a small-town bird. Find the habitat that offers the greatest advantages for the kind of a bird you are.

* * * *

Manhood, not scholarship, is the first aim of education. — *Ernest Thompson Seton.*

* * * *

Worry is the interest paid on trouble before it falls due. — *Mueller Record.*

* * * *

A business genius is a man who knows the difference between being let in on a deal and taken in on once. — *California Highways.*

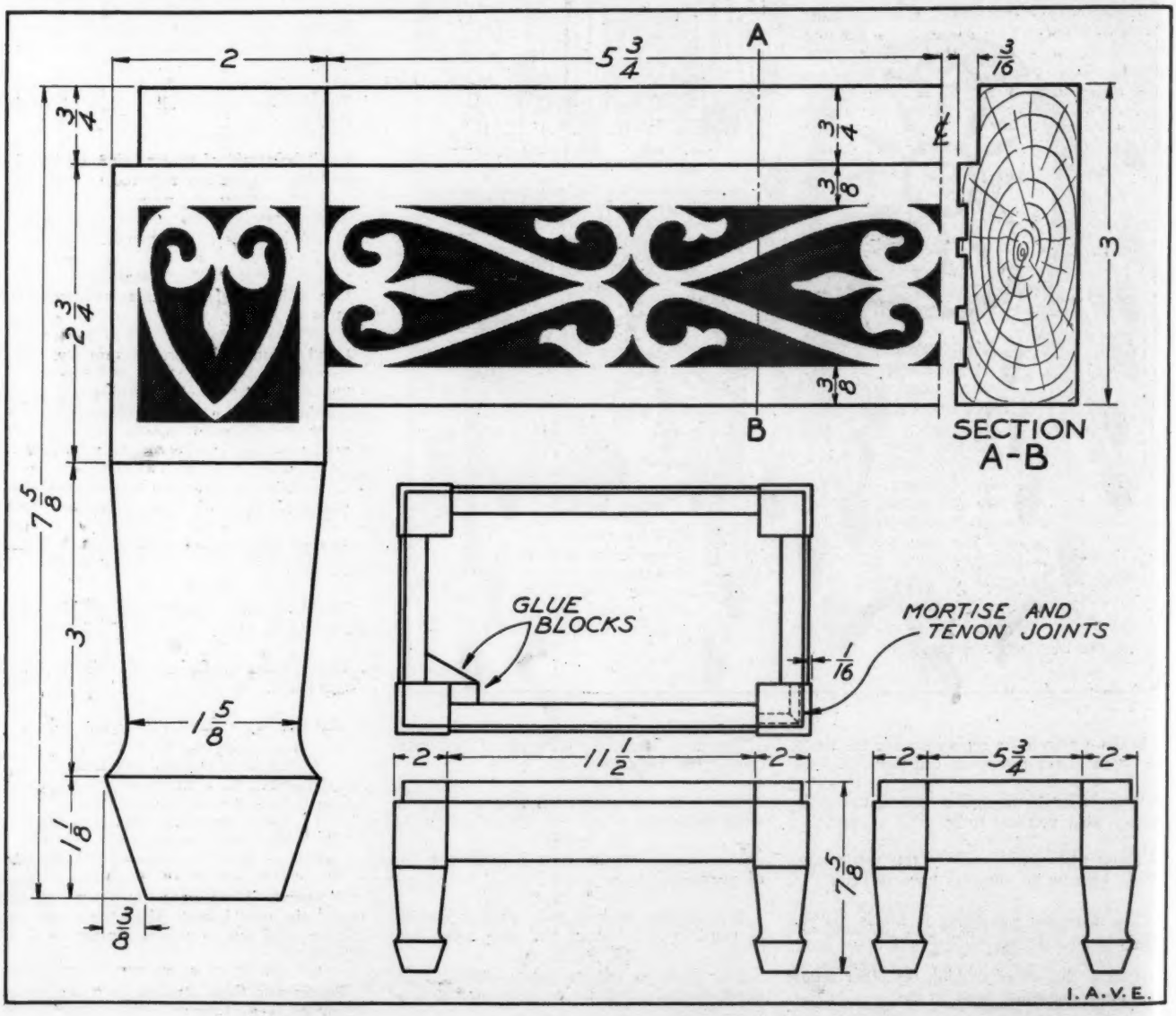
CARVED FOOTSTOOL

James McGregor,
Pasadena, California

This project shows what has been accomplished by a ninth-grade boy who was interested in woodcarving.

This particular footstool was selected because the boy wanted to make it, and had a particular use for it in his home.

Mortise-and-tenon or dowel joints may be used depending upon the ability of the pupil at joinery. The carving was traced on the wood from a full size tracing, using pencil carbon paper. The design was then cut in lightly with a veining tool. Better results are had by doing this because if the pupil does the setting or vertical cutting by simply following the pencil lines of the design, he is very likely to go off the line and spoil the effect of the finished work. By following the lines made by the veining tool the setting or vertical cutting was next done with flat gouges and the setting maul. The setting of the complete design on one rail or one leg should be completed before proceeding to the next step, namely, the grounding. The ground-



Carved footstool

ing means cutting away the waste wood, or the parts shown by the shading. This is done with a flat gouge in most places with the exception of the corners which require a ⅛-in. chisel. Some carvers prefer to have the ground gone over with a punch after the required depth has been reached. A simple punch may be made from a spike by cutting off the point square and filing a number of small grooves on the square end with a triangular file.

The spade foot on the leg is formed on the jointer, and the rabbet for the upholstery can be more accurately made if done after the work is assembled.

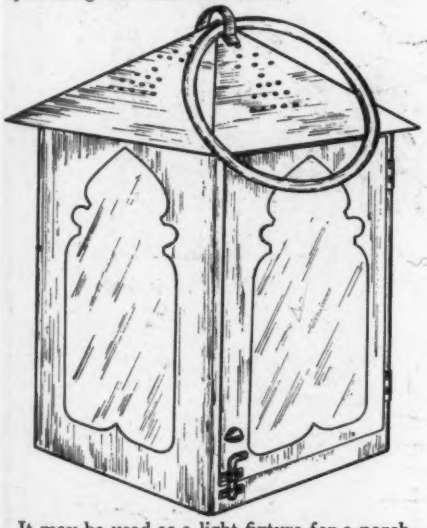
The finish used is water stain the desired color and one coat of wood filler, followed by the usual sealer coat and the final finish with lacquer, varnish, or synthetics. Hardwood, such as black walnut, mahogany, or oak, is recommended for this project.

The footstool is then ready for the upholstering.

COPPER LANTERN

W. C. Bohnsack,
Steuben Junior High School,
Milwaukee, Wisconsin

The lantern described in this article is made entirely of copper and coppered Bessemer rod. Being made of a metal that does not deteriorate when exposed to the weather, it is practically everlasting insofar as the action of the elements is concerned. The only chance for rust is at the ends of the coppered Bessemer rods. This may also be eliminated by tinning the ends with solder.



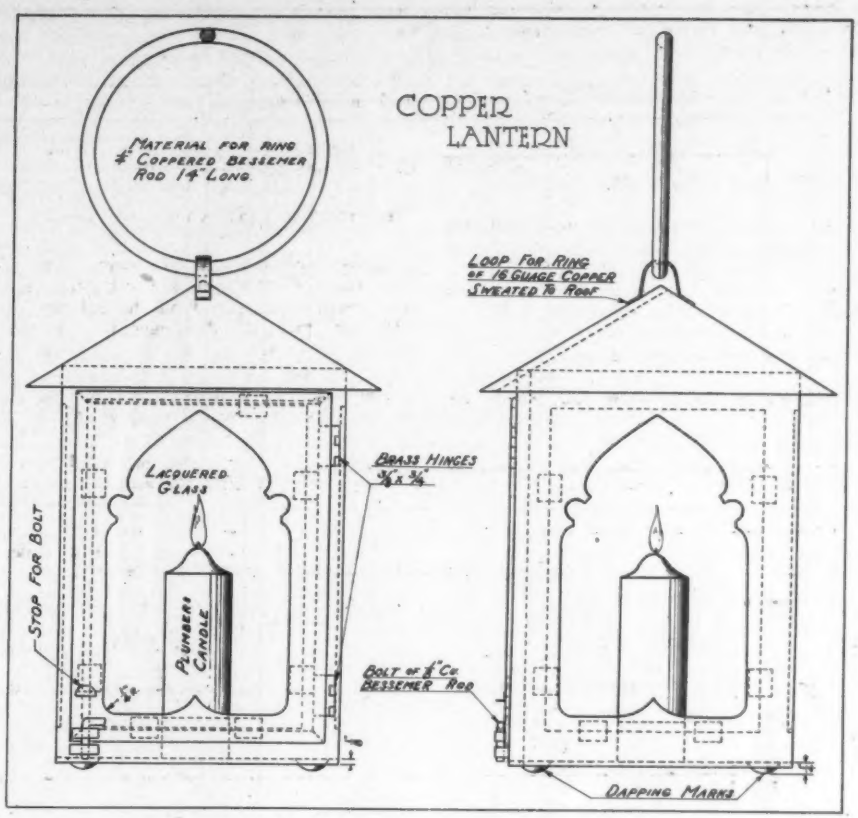
It may be used as a light fixture for a porch, or a pair may be made for the fireplace, where a soft light is desirable.

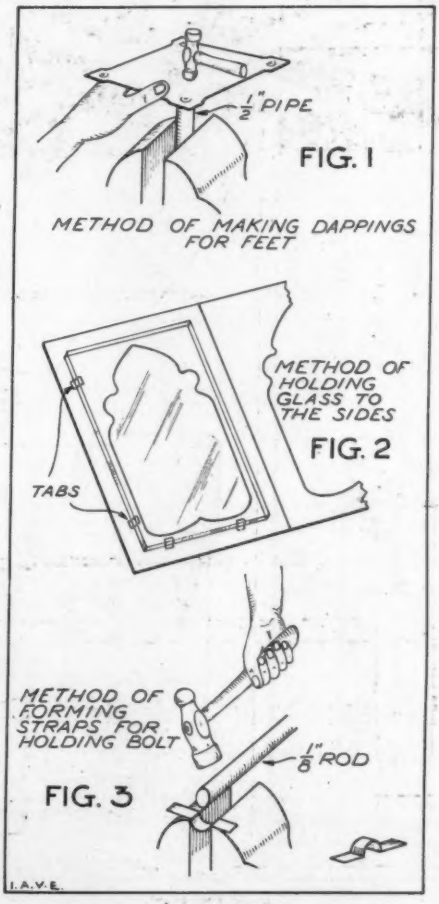
It is an excellent project that gives practice in sheet-metal layout, piercing, and soldering.

The lantern may be made to be used with a candle or may be wired for electricity. If it is to be used as an electric lantern, the construction is greatly simplified. Making it for electric lights eliminates the bottom and the door. The holes in the roof, of course, would also be eliminated if it is to be used for an electric bulb instead of a candle.

The Sides

1. Cut the material for the sides of lantern (18-oz. copper 7⅜ by 21¼ in.).
2. Choose the design and transfer it to three sides.
3. Drill or punch holes for coping saw and cut openings according to the design chosen.

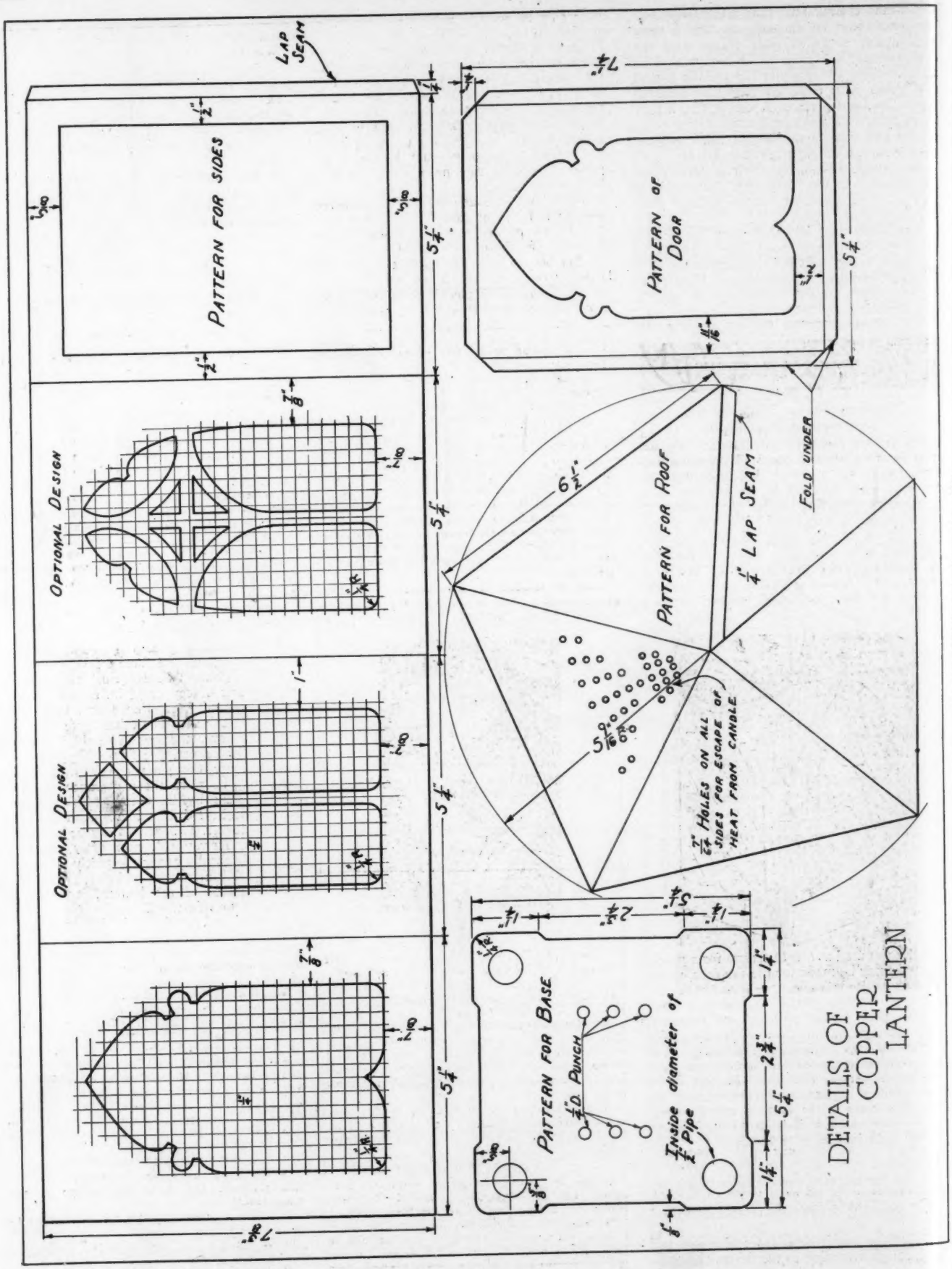




4. Smooth edges with a fine file.
5. Cut window glass 4 by 6 in., and place over openings on the three sides.
6. The glass is held against the sides by small pieces of copper ½ in. square. ⅛ in is bent ninety degrees, tinned and sweated to sides next to glass. The other three eighths is then bent over the glass to hold it securely against the copper. See figure No. 2.
7. Lacquer the glass on the inside. The glass may be given the appearance of art or stained glass by lacquering with mahogany lacquer. Use a soft camel-hair brush and brush on the lacquer. It begins to dry or set almost instantly. If you will now draw the brush lightly, diagonally across the partly set lacquer it will give it a truly stained-glass finish. Being on the inside of the lantern, it cannot be scratched or rubbed off.
8. Bend and tin the ¼-in. lap seam.
9. The sides are bent to shape by placing corners over the edge of flat stock that is held in the vise. By using only the hands a nice slightly rounded corner may be obtained that is free from all hammer or mallet marks.
10. Flux and sweat the ¼-in. lap seam by holding the hot, well-tinned soldering iron against the seam on the inside of the lantern.
11. Remove any solder that may have come out of the seam and the sides are completed.

The Roof

1. Select a piece of 18-oz. copper large enough for the pattern of the roof.
2. Lay out and cut pattern for roof.
3. Clean and tin ¼-in. lap seam.
4. Drill 7/64-in. holes for escape of heat from candle.
5. Bend roof to shape by forming over edge of flat stock held in vise.
6. Sweat seam together by holding soldering iron against seam on inside of roof.


LAP SEAM
PATTERN FOR SIDES
PATTERN OF DOOR
OPTIONAL DESIGN
OPTIONAL DESIGN
PATTERN FOR ROOF
1/4" LAP SEAM
FOLD UNDER
2" HOLES ON ALL SIDES FOR ESCAPE OF HEAT FROM CANDLE
PATTERN FOR BASE
1/4" D. PUNCH
Inside diameter of 1/4" Pipe
DETAILS OF COPPER LANTERN

7. Remove any solder that may show from the outside and file the sharp corners of roof.

The Door

1. The door is made of 18-oz. copper 5¼ by 6 in.
2. Transfer and cut out the design of the door. It should be the same size as the design on the other three sides.
3. Fold under ¼ in. on all edges.
4. Place glass and hold by placing small tabs of copper around it, as shown in Figure No. 2.

The Bottom

1. Cut pattern from 18-oz. copper, 5¼ by 5¼ in.
2. Punch ¼-in. holes in bottom for circulation of air.
3. The candle socket is made of 18-oz. copper, 1 by 4 1/16 in.
4. Tin ⅛ in. for lap seam. Form into circle and sweat seam.
5. Place in center of bottom and solder to bottom by fluxing bottom edge. Place small beads of solder around inside and hold a hot, well-tinned soldering iron against the bottom from below.
6. Make dapping marks for feet with 6-oz. ball-peen hammer and ½-in. pipe. See pattern for position of dappings, and Figure 1 for method of forming dapping marks for feet.

The Bolt

1. The bolt is made of ⅛-in. coppered Bessemer rod, 1¼ in. long.
2. The straps are made of 18-oz. copper ¼ by 1 in., as shown in Figure 3.
3. The stop for the bolt is used to prevent the bolt from being pulled out and lost.
4. The stop is a piece of 18-oz. copper ⅜ in. in diameter. It is folded through its diameter and tinned and sweated to the door above the bolt.

Assembly

1. Solder hinges to door and place door in proper position. Mark the position of the hinges, open door and solder hinge to lantern. Be careful not to get solder in movable parts of hinge.
2. Place and solder sides to roof from the inside.
3. Insert bottom in proper position (⅛ in. from bottom edge) and solder at corners.
4. Form ring of ¼-in. coppered Bessemer rod and solder joint.
5. Make strap for holding ring of a piece of ¼ by 2½ in. by 16-gauge copper. Form to fit top. Tin flat parts, insert ring and sweat to top.
6. Remove all visible traces of solder and polish with steel wool.

PERSONAL NEWS

E. J. Lake Dies

♦ E. J. LAKE, professor emeritus of art and design at the University of Illinois, and past editor of the INDUSTRIAL ARTS MAGAZINE, died from a heart attack on July 1, 1940, at the age of 70.

Mr. Lake was born at Edinburg, Scotland, on May 5, 1870. He attended high school at Viroqua, Wis., the Rose Polytechnic Institute in 1891 and 1892, and received the degree of S.B. in architecture from the University of Illinois in 1895. He also attended Pratt Institute during 1898 and 1899, London School of Art, London, England, in 1908, and the Julian Academy, Paris, France, in 1909.

E. J. Lake

He was instructor of art at the University of Illinois from 1895 to 1897 and from 1900 to 1906. He taught art at the summer sessions, 1905 and 1906 at the University of Wisconsin, and at the Stout Institute during the summers of 1910, 1911, 1912, and 1913. He was appointed assistant professor of art at the University of Illinois in 1906. Later he was appointed head of the department of art and design at that institution, which position he held until his retirement in 1938.

He was one of the editors of the INDUSTRIAL ARTS MAGAZINE from its inception in 1914 until 1930.

He was the author of the "Illinois Courses of Study for the Common Schools" and wrote many magazine articles and editorials. He was also active in a number of professional educational associations.

Mr. Lake is survived by two sons and a daughter.

Louis C. Petersen Dies

Louis C. Petersen, who has been head of the industrial-arts department at Southern Illinois State Normal University, Carbondale, Ill., for the past 32 years, died at his home, April 30, 1940.

He was born at Thisted, Denmark, in 1878, and came to this country at the age of 13. He settled with relatives in Worchester, Mass., and while there, earned his livelihood by working in a machine shop, at the same time attending evening school to achieve a graduation diploma from high school.

Later he enrolled at Northwestern University and received an S.B. degree from this institution in 1903. He was instructor of industrial-arts at

Louis C. Petersen

Northwestern Military Academy in 1904. He also taught in the high school at Seattle, Wash., and later was appointed head of the industrial-arts department at the State Teachers College at Edmond, Okla. In 1908 he was appointed head of the industrial-arts department at the Southern Illinois Normal University and served in that capacity until his death. He is the author of several books on industrial-arts work, and also was a contributor to the professional magazines in his field.

He was highly esteemed as a hard and earnest worker and will be missed by all who knew him. Mr. Petersen is survived by a wife and three sons.

George M. Brace Retires

George M. Brace, director of vocational education and industrial-arts work at St. Paul, Minn., for many years, retired in June, 1940.

He was born in Janesville, Wis., in 1869. Beloit College conferred the degree of A.B. on him in 1891 and he took graduate work at the University of Minnesota, Colorado State College, Fort Collins, and at the State Normal School at Oswego, N. Y.

He is also known as an author and writer of professional literature.

At a banquet given in his honor on May 28, 1940, a letter by Dr. C. A. Prosser was read, from which the following paragraph is taken:

"He (George M. Brace) has given all his professional life as an educator to the field of practical education. First, a leader in the movement for industrial arts, he took over vocational education, particularly trade and industrial education, after the Smith Hughes Act was passed at Washington. The progress that has been made in both manual arts and in vocational education in St. Paul is an enduring monument to him. He was in the deepest sense a pioneer in the work, not only in St. Paul, but in Minnesota. Both the city and the state owe him a debt of gratitude for the contribution he has made to the kind of education

George M. Brace

that prepared youth to meet the real demands of life."

Mr. Brace's many friends all over the United States join in the wish that he may enjoy many happy years, now that he has the leisure and opportunity to do what he wants to do.

♦ Graduate students attending the summer session of the industrial education department, Kansas State Teachers College, Pittsburg, Kans., participated in the eighth annual tour visiting schools and industrial establishments at Pittsburg, Neodesha, Independence, and Coffeyville. The tour was held on June 20, 21, and 22, 1940.

Merit L. Laubach Retires

Merit Lees Laubach, head of the department of industrial arts, Indiana State Teachers College, Terre Haute, Ind., has retired.

It is with a feeling of regret that one chronicles the resignation of a pioneer like Mr. Laubach, who has spent a total of 47 years in the education of American youth.

He was born at Fairmount Springs, Pa., Aug.

15, 1872, received his S.B. degree at State Normal School, Bloomsburg, Pa., 1895, his A.M. degree at Indiana University, 1928, and did further graduate work at that institution.

He taught in the rural ungraded schools of Luzerne County, Pa., was teacher of industrial-arts work for four years at the State Normal School, Bloomsburg, Pa.; and put in a like number of years in the same subject at the high school, Wilkes Barre, Pa.

Merit L. Loubach

He has always been earnestly active in professional organizations and is a charter member of the Mississippi Valley Manual Arts Conference, and of the Indiana Industrial Education Association. He is a member of the National Education Association and the American Vocational Association. He has also contributed to the professional literature in his field.

The many friends made during these years, and during the 35 years which he spent as head of the industrial-arts department of Indiana State Teachers College join in wishing him many years of satisfying leisure now that the exacting time of professional duties are over.

Gordon O. Wilber Promoted

Gordon O. Wilber, member of the faculty of the Oswego Normal School, Oswego, N. Y., was

Gordon O. Wilbur

appointed head of the industrial-arts department of that institution to take the place vacated about a year ago by the retirement of Dr. Joseph C. Park.

Mr. Wilber was born in Little Valley, N. Y. He took the general industrial course at the Buffalo State Normal School in 1922. He received the degree of S.B. in Education from the New York University in 1930 and took work at Oswego State Normal School; Teachers College, Columbia; State College for Teachers, Albany, N. Y.; and at the Rhode Island School of Design, Providence, R. I. He received his A.M. degree from the Ohio State University in 1936 and has since done additional graduate work at that institution.

His teaching experience includes seven years service as instructor of industrial arts at the high school at Islip, Long Island, two years in Little Falls before joining the faculty of the Oswego Normal School as instructor in general metal in the fall of 1933. His experience also includes work as head of the department of industrial arts during two summer sessions at Ohio University at Athens, Ohio. He is president of Alpha chapter of Epsilon Pi Tau in Ohio State.

He is well known as a capable writer and speaker on professional matters in his field of education.

Dr. Lee Named Dean

Dr. Edwin A. Lee, former superintendent of public schools in San Francisco, Calif., has been named dean of the School of Education on the Westwood campus of the University of California at Los Angeles.

Announcement of the appointment was made in San Francisco on Friday, May 24, after a meeting of the Board of Regents of the University, and was received by Dr. Lee's many admirers with satisfaction as it brings back to California an outstanding American educator.

The appointment was in recognition of the work done by Dr. Lee since he left his post in the field of vocational education at the University of California to become superintendent of public schools in San Francisco, then director of the National Occupational Conference, and lastly professor of education at Columbia University.

In his new post, Dr. Lee succeeds to the vacancy created by the death of Dr. M. L. Darsie.

♦ CHARLES H. JUDD of Chicago, has been appointed director of the NYA student work program at Washington, D. C.

Dr. Judd, chairman of the department of education at the University of Chicago for 27 years and a leader in American education, has been on the NYA staff as a consultant for nearly two years. In this period he has directed the development of the NYA program of related training for out-of-school unemployed young men and women. Dr. Judd was born in British India of American parents. He received his A.B. degree from Wesleyan University in 1894; Ph.D. from the University of Leipzig in 1896; and A.M. from Yale in 1907, and degrees from several other colleges.

♦ R. RANDOLPH KARCH, for the last three years technical supervisor of the Department of Publishing and Printing, Rochester Athenaeum and Mechanics Institute, Rochester, N. Y., was appointed principal, Printing High School, Cincinnati, Ohio. Mr. Karch formerly taught in Cincinnati in 1924 and 1925, then went to Steubenville, Ohio, and Pittsburgh, Pa. The Cincinnati Printing High School is one of the two in the country which boasts of its own building, and excellent equipment in both letterpress and offset lithography.

♦ ROBERT W. ENGLISH, formerly instructor in industrial arts at the Granite City Community High School, Granite, Ill., has joined the faculty of the Southern Illinois Normal University, Carbondale, as a member of the industrial-arts department.

After doing his undergraduate work at James Milliken University, Decatur, Ill., Mr. English took his master's degree at the University of Illinois, and he has done additional work at Washington University and St. Louis University.

♦ PHILIP S. VAN WYCK of Minneapolis, Minn., has been appointed as special consultant on mechanical and technical training in the Washington office of the NYA.

Mr. Van Wyck is a graduate of Purdue University, Lafayette, Ind., and he also studied at the University of Minnesota and Colorado State College. He has been head of the machine, mechanical-drafting, auto and welding department of Dunwoody Institute, Minneapolis for the last 15 years.

♦ JOHN H. LASHER, Wisconsin NYA administrator for the past five years, has recently assumed duties as director of the work projects division in the Washington NYA office. He will supervise NYA projects carried on throughout the United States.

Mr. Lasher was an honor graduate of the University of Wisconsin, and served as a member of the rehabilitation division of the state board of vocational and adult education for eight years before starting his NYA work.

♦ VERNE L. PICKENS, formerly supervisor of industrial arts for Kansas City, Mo., has been made director of practical arts for that city. He will have charge of both homemaking and industrial arts. He also taught a six weeks course at the Summer Session of Colorado State Agricultural College, Fort Collins, Colo.

♦ GEORGE F. BILLEY has recently been appointed director of vocational education of the State Prison of Southern Michigan. Mr. Billey's experience includes trade teaching and administration in the public schools of various states, trade-training supervision for the NYA, practical factory experience, and supervisory work in the vocational division of the Government Employment Service.

♦ J. HENRY SCHROEDER, who has served on the faculty of the Southern Illinois Normal University, Carbondale, for the past 17 years, has been appointed head of the industrial-arts department of that institution to fill the vacancy left by the death of Louis C. Petersen.

♦ JOHN FAVILLE, JR., Milwaukee, will succeed John H. Lasher as deputy state administrator. Mr. Faville, a Beloit, Wis., graduate, taught history at Oshkosh High School and at the Stout Institute at Menomonie, Wis. For three years he was director of education at the Wisconsin State Prison at Waupun before entering NYA service.

♦ DR. A. H. EDGERTON, guidance and placement director, University of Wisconsin, Madison, returned to East Texas State Teachers College, Commerce, Tex., for the first three weeks of their 1940 summer sessions to teach industrial education and vocational guidance.

♦ RAY A. WIGEN, instructor in woodworking at Stout Institute, Menomonie, Wis., since 1933, has been made supervisor of practice teachers, to succeed Fred L. Curran who resigned in spring. Mr. Curran is retiring after 42 years of teaching, of which 32 were spent at Stout.

♦ *Correction:* In the May, 1940, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION it was stated that Ivan Wickham had been appointed to the apprenticeship and vocational-training department staff of the Grand Rapids, Mich., High School. This should have read the Grand *Haven*, Mich., High School. In this same issue it was mentioned that Lewis H. Hodges had been added to the apprenticeship and vocational training staff of the High School at Grand Rapids, Mich. Mr. Hodges has been connected with the apprenticeship and vocational training staff of the High School at Grand *Haven*, Mich., for the past two years.

ASSOCIATION NEWS

♦ The American Industrial Arts Association held its meeting in conjunction with the National Education Association Convention on July 1 and 2 at the Y.M.C.A. in Milwaukee, Wis.

At the first session the scope of the American program of industrial-arts education was discussed. Louis V. Newkirk, director of industrial arts, Chicago, speaking on the "Junior High-School Program" described how Chicago is meeting this problem. Hugh P. Harshbarger, director of industrial arts, Des Plaines, Ill., explained a high-school program requiring 60 minutes per day, 5 times a week, consisting of 8 weeks of instruction in wood, 8 in metal, 8 in printing, 8 in drafting, and 8 in electricity. He emphasized that guidance had to accompany every step of this work. Grace M. Baker, chairman, division of the arts, Colorado State College of Education, Greeley, advocated the introduction of industrial

(Continued on page 18A)

MEN OF TOMORROW

are moulded Today

... In the shops of vocational and manual training schools — many generations of boys have been taught an appreciation of the value of working with the hands . . . an appreciation for working with the best of tools.

Through a hundred years of saw making experience, Disston has come to know the importance of shop instruction in contributing to the student's future life and . . . Disston has improved the company's teaching aids for helping you teach your students how to use the right tools in the right way.

Disston issues charts for the school room and literature of an educational nature for the use of teachers in vocational instruction. A service, at nominal cost, of repairing and refitting saws used as school equipment was adopted years ago in order that schools could get the best possible results from equipment used.

Write for information about this Disston vocational service. Samples of Disston Hand Saw Chart, File Chart, and Hack Saw Chart, and educational literature, will be sent to instructors on request.

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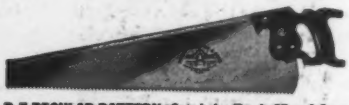
At right is shown miniature reproduction of Disston Hand Saw Chart. 17"x 22" in size. Similar charts on Files and Hack Saws are available to instructors.

A Few Useful Disston Tools

D-8 REGULAR PATTERN, Skew-Back Hand Saw. 20, 22, 24 and 26 inches. Also made in Lightweight Pattern in 26", differs in width of blade only.

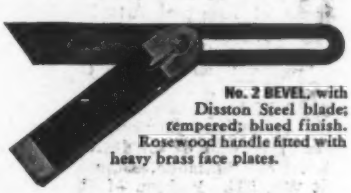


D-7 REGULAR PATTERN, Straight-Back Hand Saw. 20, 22, 24 and 26 inches. Also made in Lightweight Pattern in 26".

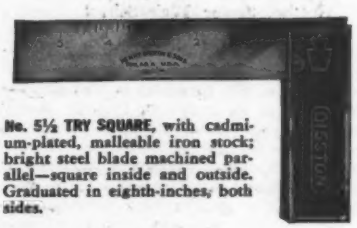
No. 4 BACK SAW, the handiest of all saws for cutting mitres, grooves, tenons, mouldings and other shop work requiring accuracy. 8 to 16" inclusive.

No. 10 COPING SAW, with frame of Disston Steel. Blades available for cutting wood, Bakelite, celluloid, bone and composition board.

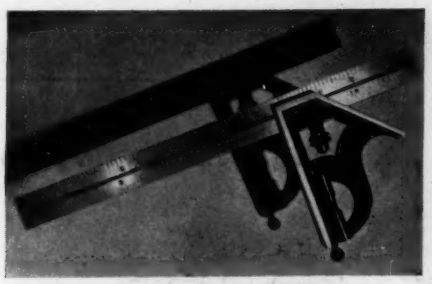
No. 76 MARKING GAUGE, made of hardwood, with graduated stem. Adjusting screw bears against brass plate in head to prevent wear.



No. 2 BEVEL, with Disston Steel blade; tempered; blued finish. Rosewood handle fitted with heavy brass face plates.



No. 5½ TRY SQUARE, with cadmium-plated, malleable iron stock; bright steel blade machined parallel—square inside and outside. Graduated in eighth-inches, both sides.



A GOOD COMBINATION

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There are excellent reasons why the tools you supply your boys should bear the Starrett name. First, nearly all of the tools considered essential for shop class needs were invented or perfected by The L.S. Starrett Company. Second, they are available in the most appropriate sizes and assortments in the form of Starrett Student Kits. Third, they are priced to fit the average shop equipment budget. Fourth, they are the tools the boys themselves will use when they become skilled craftsmen.

STARRETT EDUCATIONAL SETS

To help you teach your boys how to use the essential tools, we have made up these Starrett Educational Sets. Fourteen blue printed pages, each showing a different tool and illustrating its various uses. 8" x 10½" size, punched to fit a standard student's notebook, furnished at 10 cents per set. Also available in large size for instructor's use.

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Standardize on

(Continued from page 304)

arts into the college curriculum as a core program in which the student is led to integrate all of his experiences and knowledges with the industrial-arts content. Burl N. Osburn, professor of industrial arts, State Teachers College, Millersville, Pa., read a paper on the value of industrial-arts work in the adult program.

In the Tuesday afternoon session, under which Roy R. Van Duzee, supervisor, industrial-arts department, public schools, West Allis, Wis., presided, state programs of industrial-arts education were discussed. At this meeting, John A. Whitesel, Teachers College, New Britain, Conn., presented a comprehensive paper on the "Characteristics of State Programs of Industrial Arts Education." Amo De Bernardis, public schools, Portland, Ore., presented a paper on the "Oregon and Pacific Northwest Programs" and Harold G. Palmer, State Teachers College, Cedar Falls, Iowa, on the "Iowa and Middlewestern Programs." "The Development of a State Curriculum" was the subject of a paper read by Clyde A. Bowman, Dean, School of Education, Stout Institute, Menomonie, Wis. "The Problem of High-School and Institutional Accrediting" was presented by Elliot C. Hutton, Senior High School, Tucson, Ariz.

William E. Warner, as president of the American Industrial Arts Association, then gave an historical sketch of the founding of this association. He stated as its purposes, first, to clarify and foster the ideals inherent in industrial-arts work; second, to establish and maintain relationships with the National Education Association; third, to establish and maintain relationships with other noninstructive groups such as labor, industry, and the like. He also emphasized close alliance with the leaders in art and announced that a constitutional convention will meet at the N.E.A. to be held in February, 1941, at Atlantic City, N. J. The spring conventions of the N.E.A. are always to be considered as the time for policy and planning conferences.

On Tuesday at 6 p.m. a Fellowship dinner conference was held at which Roy Radtke, supervisor of industrial arts, explained the out-of-school professional improvement work undertaken by the industrial-arts teachers of Milwaukee.

A luncheon conference, held jointly with the department of art education, included an illustrated lecture on "The Development of Modern Design in our Time" given by Marianne Willisch, noted designer and authority on design of Vienna, director, Chicago Workshops, Chicago.

♦ The Vocational Department of the National Education Association held several meetings at the 78th annual meeting of the N.E.A. at Milwaukee, Wis., June 30 to July 4. At the first of these meetings, the economic problems of the beginning worker were discussed. George P. Hambrecht, director, Wisconsin State Board of Vocational and Adult Education, Madison, presided. Orin W. Kaye, state director, National Youth Administration, Lansing, Mich., discussed, "The Problems of Unemployed Youth" and F. C. Rosecrance, associate professor of education, Northwestern University, Evanston, Ill., read a paper on the adjustments necessary for an occupational career.

At the meeting on July 2, Robert L. Welch, state supervisor, trade and industrial education, Madison, Wis., presided over a session at which the relationship of industrial arts and vocational education was discussed. Clyde A. Bowman, Dean, School of Industrial Education, Stout Institute, Menomonie, Wis., spoke on "Industrial Arts," and Harry O. Eiken, director, School of Vocational and Adult Education, Green Bay, Wis., on "Vocational Education." Then followed a discussion panel in which the participants were: Tom Hippaka, department of industrial arts, Iowa State College, Ames; Paul Thomas, Dean of Men, Central Trade School, Oakland, Calif.; Allen T. Hamilton, state supervisor of industrial education, Indianapolis, Ind.; Harry S. Belman, director, School of Vocational and Adult Education, West Allis, Wis.; and Roy A. Radtke, supervisor of industrial arts, Public Schools, Milwaukee.

The officers elected for the coming year are Harry S. Belman, president, and Paul Thomas, secretary.

At the July 3 meeting, George P. Hambrecht presided. At this meeting Edna P. Amidon, chief, Home Economics Education Service, U. S. Office of Education, Washington, D. C., discussed the "Importance of Homemaking Education for Out-of-School Youth and Adults." William F. Rasche, director and principal, Milwaukee Vocational School, Milwaukee, explained "The Milwaukee Youth Survey." A panel discussion followed.

On July 4, William F. Rasche explained the "Milwaukee Program of Vocational Education," and the visiting teachers and administrators were taken on a tour through the Milwaukee Vocational School Plant.

♦ On May 10, the Industrial Education Teachers Club of the Southern Zone, held their last meeting of the school year, at the Green Lantern Inn, Owego, N. Y. Dr. Frederick James Moffitt, superintendent of schools at Hamburg, N. Y., spoke on Industrial Education.

The club members had their administrators as guests for the evening, and 76 men were present. A *Project Fair*, held after the meeting, proved interesting and informative to all.

♦ Initiating team which officiated at the installation of Phi Chapter of Epsilon Pi Tau in the State Normal School at Oswego, N. Y., on May 18, 1940, is pictured on page 20A.

Backrow: Charles E. Ball, Peekskill; Professor George C. Decker and Paul W. Miller, Buffalo; Dr. William E. Warner of Ohio State University, Columbus, national secretary; Charles F. Weigand, Niagara Falls.

Front row: James B. Rombough, Buffalo; Hugh J. Haslett, Pearl River; Richard C. Burau, Buffalo; Sol B. Lu Bow, New York City; Charles F. Turcott, Buffalo.

(Continued on page 20A)

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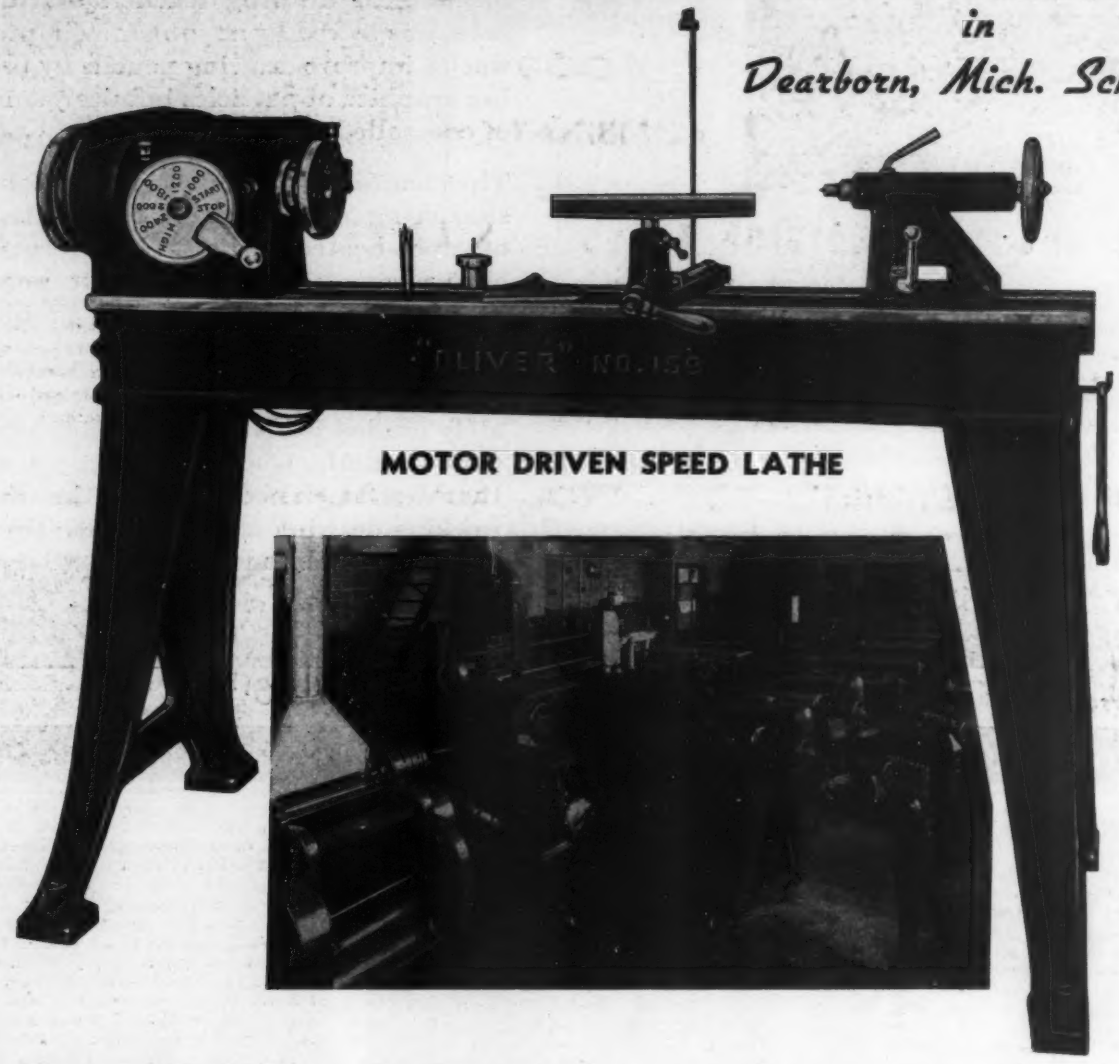

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Shipment of the more recent purchases were for 3 No. 192 18" Band Saws — 2 No. 384 Oilstone Tool Grinders — 2 No. 232 12" Tilting Arbor Saw Benches — 3 No. 159-A 12" Motor Driven Speed Lathes.

Illustrated above is the "Oliver" No. 159 "V" belt motor driven speed lathe. Safe to operate. Starts at low speed and can be adjusted from 800 to 2400. Unit construction — spindle lock — low height, bed to top of headstock 12 inches — any kind of current — the ideal school shop speed lathe.

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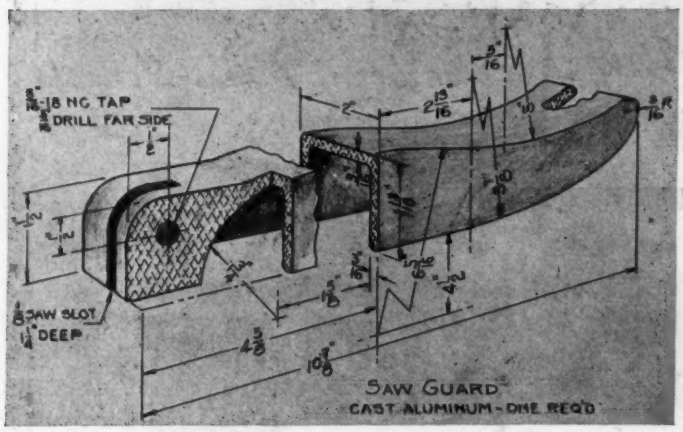

Drawn with *Typhonite* Eldorado using degrees 2H and 3H.

PROBLEM: *Ask your students to draw the correct orthographic views of this saw guard.*

SOLUTION: *For your convenience, you can get a free blueprint showing the problem's solution. Write to address below for blueprint No. 128-J9.*

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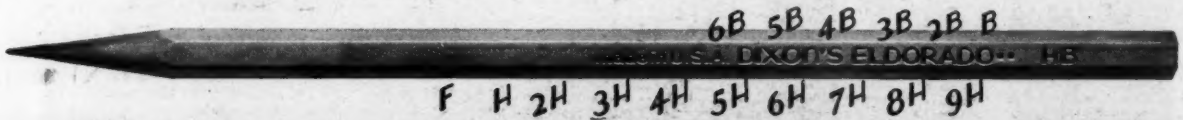

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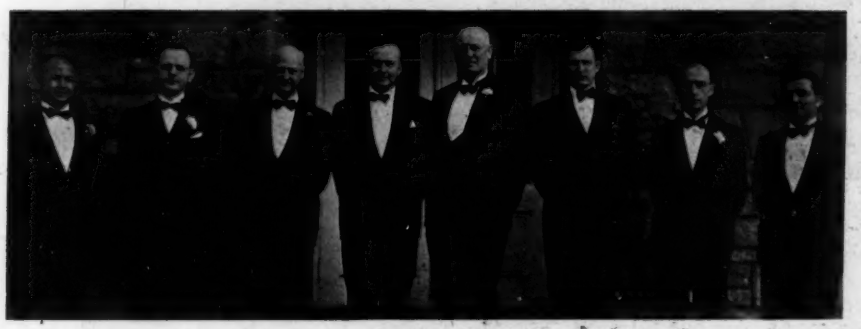

New River State College, Montgomery, W. Va. Installation team of Upsilon Chapter, Epsilon Pi Tau.

(Continued from page 18A)

♦ The Third Annual Four-State Regional Conference on Problems of the Industrial-Arts Teacher and Supervisor will be held at Kansas State Teachers College, Pittsburg, on Friday and Saturday, October 11, 12, 1940. The attendance at the 1939 Conference exceeded 300, with a substantial increase in the number of superintendents and high-school principals.

The program of the Conference is arranged in five sessions beginning on Friday morning, October 11, at 10 o'clock. The topics, and the chairmen of the committees assigned to conduct the discussions at the five sessions are as follows: Friday morning, *Problems of Organizing, Conducting, and Advertising the Industrial-Arts Program*. Chairman, A. W. Blake, director industrial education, Fort Smith, Ark. Friday afternoon, *The Place of Industrial Arts in Public Education*. Chairman, Ray E. Williams, director industrial education, Parsons, Kans. Friday evening, *Adjusting the Industrial-Arts Program to the Needs of the Community*. Chairman, William T. Bawden, Kansas State Teachers College. Saturday morning, *The Social Economic, and Philosophical Implications of Industrial Arts*. Chairman, Hoyt H. London, University of Missouri, Columbia. Saturday afternoon, *Effective Methods of Organizing Instruction Materials for Industrial-Arts Shops*. Chairman, Roy V. Lulow, Central High School, Tulsa, Okla.

♦ The fifth annual dinner of the Westchester Industrial Arts Club was held at Lawrence Inn, Mamaroneck, N. Y., on May 25. The membership is made up of the industrial-arts men in the county, and almost every city and village is represented in the roster of the organization. The new officers elected were: president, Charles Leffert, Benjamin Franklin Junior High School, Yonkers; vice-president, Herbert F. Lidstrom, Bellows High School, Mamaroneck; secretary, George Baldwin, Pleasantville High School, Mamaroneck; and treasurer, Wilbur Matteson, Mamaroneck Junior High School, Mamaroneck.

♦ The installation of Epsilon Pi Tau's twentieth chapter at New River State College, Montgomery, W. Va., was handled by a team of "Masters" for each of the above eight men holds a master's degree and five of them either now hold or will within a year hold a doctor's degree. Reading from left to right they include: Gordon O. Wilber, director-elect of the department of industrial-arts education in the State Normal School at Oswego, N. Y.; John R. Ludington, professor of industrial-arts education, University of North Carolina at Raleigh; Leigh M. Nason, professor of industrial-arts and industrial-vocational education in the New River State College at Montgomery, W. Va.; William E. Warner, professor of education, The Ohio State University, Columbus and National Executive Secretary of Epsilon Pi Tau; Orville E. Sink, chairman of the department of industrial-arts education, Ball State Teachers College, Muncie, Ind., and national officer of Epsilon Pi Tau; Victor L. Bowers, Summer Session instructor in industrial-arts education at Ohio University, Athens; R. Lee Hornbake, professor of industrial-arts education, State Teachers College, California, Pa.; and Glenn E. Best, chairman of the department of industrial-arts education, New River State College, Montgomery, W. Va., and faculty sponsor of the new chapter.

♦ More than 1,000 delegates and guests were in attendance at the fifth annual convention of the Wisconsin Association for Vocational and Adult Education at Manitowoc, May 3 and 4. The vocational schools throughout the state closed to permit teachers and staff members to attend.

The steamship *North American* was chartered by the association to be used as a floating hotel to accommodate the overflow of delegates from the headquarters hotel, Hotel Manitowoc, which was completely sold out as early as November. Entertainment was provided aboard the boat for delegates and guests. Governor Heil sent his greetings to the convention.

(Continued on page 23A)

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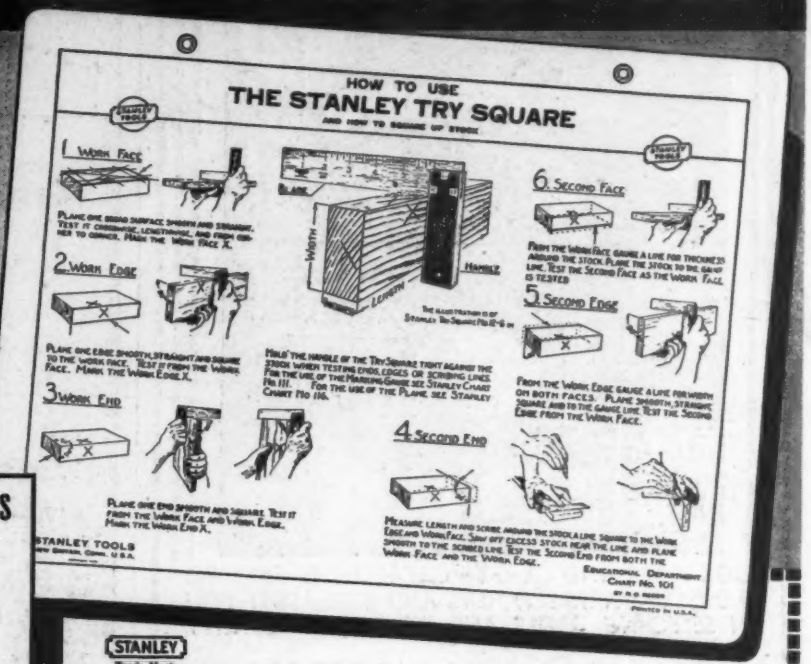

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No. C125 Butt Gauge	No. C101 Try Square
No. C126 "T" Bevel	No. C111 Marking Gauge
No. C123 Cabinet Scraper	No. C53 Riveting Hammer
No. C124 Hand Scraper	No. C56 Setting Hammer
No. C116 Stanley Plane	No. C33 Flat Cold Chisel
No. C122 Stanley Block Plane	No. C34 Cold Chisels
No. C114 Double Plane Iron	No. C31 Ball Pein Hammer
No. C115 Setting Stanley Plane	No. C32 Straight and Cross Pein Hammers.
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Installation team of Phi Chapter, Epsilon Pi Tau, State Normal School, Oswego, N. Y.

(Continued from page 20A)

The first general session was addressed by Dr. Charles Copeland Smith, representing the National Association of Manufacturers. He spoke on the topic "What Industry Expects of Vocational Education" and John Reid, Secretary of the Michigan State Federation of Labor, spoke on "Labor's Thoughts on Vocational Education."

The second general session, having as its theme "Vocational Adjustment," was addressed by Robert K. Burns, Science Research Associates, Chicago, and Miss Mary P. Corre, President of the National Vocational Guidance Association.

Homemakers' Clubs of the state met with the Wisconsin Association for Vocational and Adult Education for the first time and sent over 100 delegates to the convention.

The highlight of the entertainment provided for the convention visitors, was the performance put on by members of the circus training course of the Manitowoc Vocational School. This training program has received recognition throughout the United States and some foreign countries. Graduates are being consistently placed.

The convention program of some of the sectional meetings were as follows:

Agriculture. Vice-President, John F. Jones; Chairman, J. F. Wilkinson. "Farm Safety"—Professor F. W. Duffee, Agricultural Engineering Department, University of Wisconsin. *Attendance Officers*. Past President, G. T. Fiedler; Chairman, Elsie Marcklein. "School Welfare Work and its Relation to the Community"—John J. Kenney, Chief Probation Officer, Milwaukee Juvenile Court. (Round-table discussion.) *Co-ordination*. Vice-President, E. H. Funk; Chairman, Carl Bertram. "Advisory Committees"—Frank Jewson. "Plan for Effective Cooperation and Exchange of Ideas Between Co-ordinators, Supervisors, and Teacher Trainers"—a general discussion. *Distributive Occupations*. Vice-President, G. J. Ehart; Chairman, Warren G. Meyer. "Training the Retail Store Employee"—Paul Mertz, Director of Company Training, Sears Roebuck and Company, Chicago. *Homemaking*. Vice-President, Katharine Schultz; Luncheon Chairman, Irene Braun. Introduction of Speakers, Dora Rude, State Board of Vocational and Adult Education, Madison. Speakers: Frances Zuill, director of home economics, University of Wisconsin, and Mary P. Corre, director, Occupational Research and Counseling Division, Vocation Bureau, Cincinnati Public Schools. *Homemakers' Club*. Chairman, Irene Braun; Toastmistress, Elizabeth Fratt. Speakers: Mrs. Ruth Butler, President of Homemakers Club, Manitowoc; Dora M. Rude, Homemaking Supervisor, Wisconsin State Board of Vocational and Adult Education; George P. Hambrecht, State Director, Wisconsin State Board of Vocational and Adult Education; Sylvia Shiras, Home Economist, Household Research Center, Milwaukee. *National Youth Administration*. Chairman, John Lasher. *Rehabilitation*. Vice-President and Chairman, John A. Kubiak; Round-table conference, discussion leader, Edward J. Pfeifer. Specially Requested Participants, John A. Kratz, Washington, D. C., and Miss Tracy Copp, Washington, D. C. *Trades and Industry*. Vice-President and Chairman, G. A. Wickman; "Advisory Committees,

(Continued on page 24A)

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OUR ARTS AND CRAFTS CATALOG IS FREE TO INDUSTRIAL ARTS TEACHERS, AND WILL ASSIST YOU IN SELECTING TOOLS AND SUPPLIES OF QUALITY

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Scranton, Pennsylvania

(Continued from page 23A)

their Organization and Functions in the Development of Vocational Training"—John Reid, Secretary, Michigan Federation of Labor. *Automotive Service.* Chairman, Charles A. Johnson. demonstration and lecture. *Electricity.* Chairman, A. J. Diebold, discussion topics. *Drafting.* Chairman, C. A. Behringer, business meeting and tour. *Machine Shop.* Chairman, Wm. N. Lathrop, Tour, business meeting, and motion picture. *Printing.* Chairman, E. M. Heyman, round-table conference and tour. *Sheet Metal.* Chairman, Norvin G. Roberts, speakers and tour. *Wood Work.* Chairman, A. F. Johnson, speakers and tour. *Trade and Industrial Association.* Presiding Officer and President, G. A. Wickman, motion picture sound films, business session, and discussion.

♦ The 19th Annual Conference on Printing Education, held at the Rochester Athenaeum and Mechanics Institute, Rochester, N. Y., brought together more than 200 teachers of printing and school and printing executives from all parts of the United States and Canada. The conference was sponsored by the National Graphic Arts Education Association, and the local hosts were the Department of Publishing and Printing of the Rochester Athenaeum and Mechanics Institute, the Rochester Typothetae, the Rochester Club of Printing House Craftsmen, and the Rochester Public Schools.

The program featured the 500th Anniversary of the Invention of Printing and clinical sessions on teaching problems in the various types of schools offering printing instruction. The anniversaries were brought into prominence at a special religious service at the opening of the conference on Sunday, June 30, and at the annual banquet on Tuesday evening, July 2.

The banquet was an exceptionally brilliant affair, with Harry L. Gage, vice-president of the Mergenthaler Linotype Company and chairman of the Advisory Council on Graphic Arts Education, as the toastmaster. The speakers were Frank J. Smith, John P. Smith Company, Rochester; T. G. McGrew, field secretary, United Typothetae of America; and Leroy Snyder of the Gannett Newspapers, Rochester.

Another featured speaker at the banquet was Thomas Roy Jones, president of the American Type Founders, who, in behalf of his company presented a silver loving cup to the Department of Printing of the Masonic Home and School, Fort Worth, Tex., as its permanent possession for having won two years in succession the annual printing specimen scrapbook contest promoted among printing student clubs in the leading printing schools of America. At this meeting also, the annual Conference keepsake, a 50 page booklet on "The First Five Years of the National Graphic Arts Education Guild," written by Fred J. Hartman, educational director, and designed and printed by C. Harold Lauck, president of the Guild for the past year, was presented.

Some of the industry speakers at the regular conference sessions were: Charles F. Mosher, president of Rochester Typothetae, Inc.; William C. Lennox, president, Rochester Club of Printing House Craftsmen; Howard N. King, typographer, The Intertype Corp., Brooklyn, N. Y.; John M. Collins, engineer, American Type Founders, Elizabeth, N. J.; C. R. Spicher, The Miehle Printing Press & Machinery Co., Chicago, Ill. These addresses preceded the clinical sessions or "symposia" on teaching problems, covering lay-out, type composition, presswork, and the teaching of related subjects.

At the business meeting, which brought the convention to a close on Wednesday, July 3, it was voted to change the name of the organization from the National Graphic Arts Education *Guild* to the National Graphic Arts Education *Association.* A cordial vote of thanks was extended to R. Randolph Karch of the R.A.M.I., the local chairman of the Conference, who is leaving Rochester to become the principal of the Printing Vocational High School in Cincinnati, Ohio.

The newly elected officers are: president, Chester A. Lyle, Timken Vocational High School, Canton, Ohio; vice-president, Hupp E. Otto, McKinley Trade School, Wheeling, W. Va.; secretary, R. Randolph Karch, Printing Vocational High School, Cincinnati, Ohio; and treasurer, E. S. French, Wilson High School, Washington, D. C.

The directors are the officers and the following: Harold G. Crankshaw, Central High School, Washington, D. C.; J. Henry Holloway, The New York School of Printing; C. Harold Lauck, The Washington & Lee University, Lexington, Va.; Allan Robinson, Ottmar Mergenthaler School of Printing, Baltimore, Md.; Ferdy J. Tagle, The New York School of Printing; John A. Backus, American Type Founders, Elizabeth, N. J.; and Harry L. Gage, Mergenthaler Linotype Co., Brooklyn, N. Y. Sixteen regional vice-presidents were elected also. Fred J. Hartman is the educational director, with headquaters at 719 Fifteenth Street, N. W., Washington, D. C.

The next convention will be held at Cleveland, Ohio, the latter part of June 1941.

—*Fred J. Hartman.*

♦ The Washington Industrial Education Association will hold their annual convention August 22 to 27 inclusive at Long-Beach, Wash. Arrangements have been made for the accommodation of between 150 and 200 people.

♦ The American Federation of Teachers will meet in Buffalo, N. Y., August 19 to 23.

♦ The Kentucky State Industrial Arts Association met as a regular division of the Kentucky Education Association in Louisville, on April 19.

Leonard Daugherty, supervisor of industrial arts, Louisville, and Dr. Theodore F. Struck, Pennsylvania State College, State College, Pa., were the main speakers.

The officers elected for the ensuing year are as follows: president, David M. Wherry, Dayton; vice-president, Roman A. Brom, Louisville; secretary-treasurer, Edgar Mara, Covington; and H. L. Oakley, Lexington, as the new member of the Executive Committee.—*Edgar Mara.*

MODERN TEACHING OF CERAMICS CALLS FOR MODERN FIRING METHODS

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Superintendent

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LACKAWANNA, N. Y.

July 29th
19 40

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After a thorough investigation by Mr. Francis D. McCann of our Industrial Arts Department covering the various methods and equipment available for firing ceramic products, we decided to use high temperature electric heat. We found that this method makes possible a wide range of firing temperatures, subject to accurate control, and that furthermore, it is safe for students to use in the laboratory.

Our choice of an electric kiln equipped with Globar Brand Electric Heating Elements, and the use of this equipment during the past school year, have confirmed our belief that electric heat would perfectly meet our needs and enable us to teach modern ceramic techniques with up-to-the minute equipment.

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• In upper picture, Mr. Francis D. McCann, industrial arts director (left) demonstrates "Globar" equipped furnace to Mr. C. A. Conway, Lackawanna School Superintendent.

• (Lower picture) Close-up of furnace door, showing Globar Brand High Temperature Electric Heating Elements "coming up to temperature."

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SHOP EQUIPMENT NEWS
New Products—Publications

NEW SOUTH BEND 10 IN. TOOLROOM BENCH LATHE

The new 10 in. Swing, 1 in. collet capacity series "S" toolroom bench lathe recently announced by the South Bend Lathe Works, South Bend, Ind., is a highly efficient tool for precision operations on small work. This lathe has the rigidity and stability of a floor-type lathe, combined with the speed, convenience and space-saving advantages of a bench lathe.

Smooth vibration-free operation at high spindle speeds is achieved by using a direct belt drive to the carefully balanced cone pulley and spindle assembly. The motor and driving mechanism are mounted under the headstock in the left end of the bench. The cone pulley belt passes up through the bed to the headstock. Back gears provide slow spindle speeds and ample power for machining large diameters. A convenient belt tension release lever and wrenchless bull gear lock permit rapid changing of spindle speeds.

The headstock has 1⅜ in. capacity through the spindle and can be equipped with either hand lever type or hand wheel type draw-in collet chuck, taking collets up to 1 in. capacity. Twelve spindle speeds ranging from 50 to 1357 r.p.m. are provided. Special drive equipment for higher spindle speeds is supplied to order. A full quick change gear mechanism provides power longitudinal carriage feeds .0015 to .0836 in., power cross feeds .0006 to .0313 in., and a series of 48 right- and left-hand screw threads from 4 to 224 per inch.

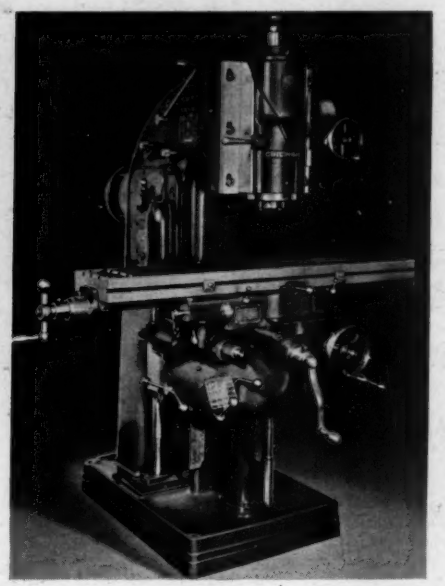
This lathe is made in 3, 3½, 4, and 4½ ft. bed lengths, providing center distances of 16⅜, 21⅜, 27⅜, and 34⅜ in. respectively. It comes mounted on a tubular steel bench, as illustrated. There are three storage drawers in the right end of the bench. The top of the bench has a rim all the way around and serves as a chip pan or oil pan. Toolroom attachments supplied with the lathe include hand wheel type draw-in collet chuck, telescopic taper attachment, micrometer carriage stop and thread dial indicator.

The telescopic taper attachment, included as standard equipment on this lathe, makes it possible to change quickly from straight to taper turning or boring without disengaging the cross-feed nut. The cross-feed screw may be used to adjust the position of the cutting tool when turning tapers, the same as for straight turning. The taper attachment is permanently mounted on the lathe carriage and is always ready for use in any position along the entire length of the lathe bed.

TWO NEW MILLING MACHINES

The Cincinnati Milling Machine Co., Cincinnati, Ohio, has just announced two new simple milling machines combining sensitivity with rigidity. These are known as the Cincinnati Nos. 1-L and 2-L type vertical milling machines. They are quick and easy to set up and operate, and are especially adaptable for miscellaneous milling operations on small- to medium-size work.

Powered by a 3-h.p. motor, the No. 1-L machine has working surface on the table of 44½ by 10⅛ and the No. 2-L table is 4¼ in. longer. Longitudinal range of the No. 1-L is 22 in. and that of the No. 2-L, 28 in.



These verticals have a moderate height table, a sliding head with a head travel of 4 in. and hand feed movement. They are supplied with or without swivel to sliding head. The swiveling of the head in degrees permits the setting of the spindle in a vertical plane at any angle, either side of zero (45 degrees to right or left) from vertical to horizontal. Vertical adjustments are made through the knee as well as through the sliding head.

Twelve spindle speeds, ranging from 67 to 1520 r.p.m. for fast cutting and delicate milling and boring operations; and power rapid traverse in six directions for quicker setups and handling, are standard features of the machines.

Twelve power feeds for longitudinal, cross and vertical travel of the table, saddle and knee are provided. The longitudinal range of the table is from ¾ to 30 in. per minute; the twelve cross-feeds of the table and saddle ranges from ½ to 20 in. per minute and power feed of the knee is from ¼ to 10 in. per minute.

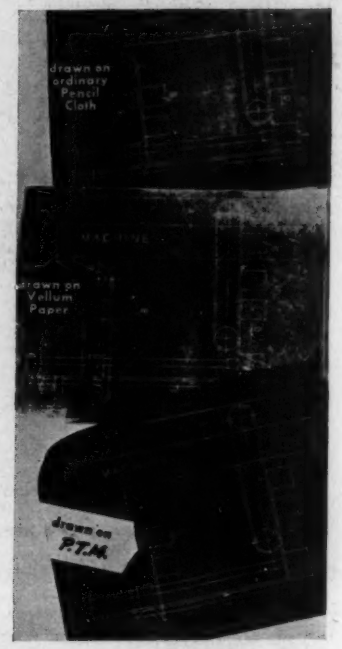
Control of the machine is simplified and the ease of engaging all operating controls is designed to hold operator fatigue to a minimum.

Designed for maximum operating ease and safety, these new milling machines have automatically disengaged operating and adjusting handles. All shafts, clutches, and universal joints are covered.

PENCIL BLUEPRINTS LIKE INK

Ink-like opacity from hard drawing pencils is the important claim for a new transparent medium that is not a tracing cloth and not a vellum.

Blueprints, made from drawings produced from ordinary hard drawing pencils on this new medium, have a solid background and sharp white lines. On Blacline prints the detail is solid and sharp, the background is uniformly white. The opacity of the pencil detail due to the drawing surface and the extreme transparency of the drawing base both contribute to the printing results.



Further advantages of this unique product are its astounding strength and body. It is moisture-proof and the cost is less than one third of the price for tracing or pencil cloth.

The standard rolls are 20 yds. long, 30, 36, 42 or 54 in. wide. It is also available in sheets plain or printed. The name of this product is P.T.M. It is an all-American product invented and produced only by The Frederick Post Company.

The company is now preparing a factual sample kit on which you can draw your own conclusion and personally compare the drafting qualities of Post Tracing Medium with the various drawing mediums. This "draw your own conclusion" kit will be sent to any person in the engineering or drafting profession upon request to the nearest Post Oval dealer or to The Frederick Post Company, P. O. Box 803, Chicago.

MAKE YOUR OWN GLOVES

The Horton Handicraft Co., 646 Capitol Ave., Hartford, Conn., have just perfected a plan whereby they can supply handicrafters and students of leatherwork with accurately cut pieces of deerskin for making well-fitting leather gloves.

(Continued on page 30A)

—To Help Speed Up School Shop Work

In cooperation with the National Defense program which implies increased school efficency—we offer *every instructor* this new free book with its many practical suggestions for securing the same uniform finishing results in school shops that furniture factories, cabinet makers and professional refinishers achieve. Gives new and authentic Information on proper use of paint, lacquer, stains, varnish, shellac, and other finishing products. Invaluable for lecture and class work.

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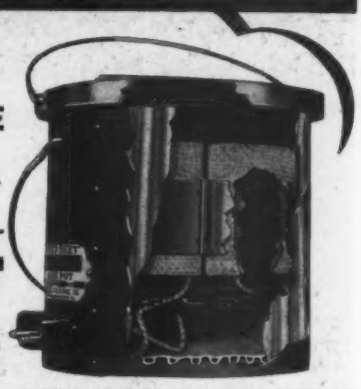

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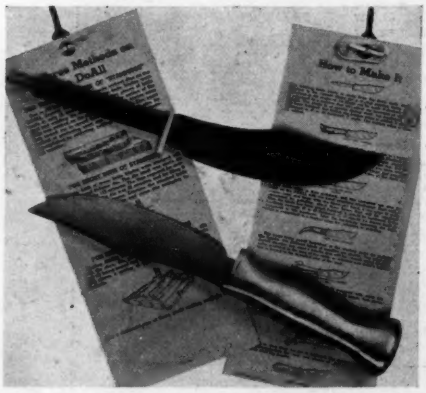
(Continued from page 26A)

The extra pieces around the fingers are provided and every hole is punched ready for sewing. The cut leather can be obtained in black, cork, natural, white, and brown. The leather is good clear stock and is so cut that every glove will fit accurately.

BLANK FOR HUNTING KNIFE

The accompanying illustration shows a blank from which a real hunting knife of fine tempered steel can easily be made. This interesting knife was first made on the Doall Metal Shaping Machine manufactured by Continental Machines, Inc., of 1301 Washington Avenue South, Minneapolis, Minn., to illustrate the wide range of work



that the Doall can handle. Countless knife blanks were stamped out from a die and inserted in a cardboard container imprinted with detailed explanations of how the work is accomplished.

One side of the cardboard describes how "all three methods on the Doall" permits the swift production of these knife blanks. If small quantities are desired, pieces of metal may be stacked together and the multiple parts sawed out in a single cutting on the Doall machine.

An economical "Continental Process" die enables knife blanks to be stamped out swiftly and accurately in quantities of a few thousand.

When high-production blanks are required, say 500,000 knife blades, the die, die shoe, punch, stripper plate, and automatic stop can be sawed and filed on the Doall in only five hours, representing a saving of 80 per cent over ordinary die-making methods.

The knife blanks in the cardboard container, complete with the explanation of how to make a fine steel hunting knife, are supplied by Continental Machines to teachers sending in their request on a school letterhead.

PORTABLE BUTT WELDER WITH BURR GRINDER

The Eisler Engineering Co. of 740–770 So. 13th St., Newark, N. J., has developed a new portable butt welder with a burr grinder and annealer mounted on a fabricated case which is portable. One of its many applications is in the repair of stranded wire where this unit is used to burn out (electrically) the faulty section and fuse all the strands, thereby preventing the ends from unraveling. The final steps are to butt-weld the two ends, and grind off any burrs that may have appeared. The grinder has an accurate adjustment to compensate for the wear in the abrasive and there are two special bushings to guide the stranded wire to the grinder which squares off the ends so as to make neater butt welds.

The butt welder is supplied with a 3 KVA air-cooled transformer and 8 point variable switch for current regulation. The unit is foot operated and the butt jaws can be water cooled for continuous service.

(Continued on page 33A)

Portable butt welder with grinder

Higgins Drawing Board Paste Saves you time and trouble, for it is quick and sure to catch • Higgins Drawing Board Paste is simple and easy to use. For mounting drawing paper to make a "stretch," apply smoothly and evenly to the margin of the board about one inch wide all around and then press the previously moistened paper down firmly and allow to dry.

Its great strength and body hold the paper in perfect shape so that washes may be applied without danger of wrinkling or warping. For ease of handling and for better finished work, specify Higgins on your next order of Inks and Adhesives and ask your dealer for one of the new Higgins Color Wheels showing Higgins Inks actually applied on drawing paper.

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On request, you will be sent a prospectus for class groups of different sizes, also, details concerning two planned pottery units designed for introducing complete pottery courses in Industrial Art Departments.

Write Department B

AMERICAN ART CLAY COMPANY
INDIANAPOLIS, INDIANA

(Continued from page 30A)

Metals from 1/16 to 3/16 in. diameter can be welded. For butt welding other sizes of wire or metals, the units are available with transformers from 1 KVA up to 7½ KVA capacity.

"PLANNING THE INDUSTRIAL APPRENTICE TRAINING SHOP"

Vocational school men who are confronted with the problem of enlarging old shops or planning new shops will find much helpful information in a timely publication, "Planning the Industrial Apprentice Training Shop," recently announced by the South Bend Lathe Works.

The book contains practical shop layouts, descriptions of methods of organizing shop work; suggestions for selection of equipment; and lists of tools and accessories for various sizes of industrial apprentice-machine shops. Most helpful of all, perhaps, is an inquiry form for requesting a shop floor-plan layout to be made by the Engineering Department of the South Bend Lathe Works. The floor plan layout service is offered free of charge and without obligation to anyone desiring assistance in planning a machine shop.

Copies of this bulletin may be had free of charge, postpaid, by writing the South Bend Lathe Works, South Bend, Ind.

NEW SAW MANUAL

The Porter-Cable Machine Co., Syracuse, N. Y., has just issued their Saw Manual No. 2, which contains much information on the productive use of their Speedmatic saw in manufacturing, building, maintenance, and equipment work.

Besides explaining how to make the best use of the Speedmatic saw, the manual contains a great deal of data of special importance to the estimator. There are also many illustrations showing how this saw may be used for making special cuts and doing difficult work.

There are also directions for the proper care

(Continued on page 35A)

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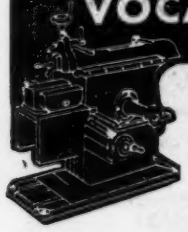

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(Continued from page 33A)

of saw blades, and specific information on the various sizes and capacities of Speedmatic saws and floor sanders and polishers.

The Porter-Cable Machine Co. will be glad to send a copy of this manual, gratis, to all interested shop teachers.

"HOW TO SHARPEN"

The Behr-Manning Corp. of Troy, N. Y., has just announced the twentieth revised edition of their booklet, "How to Sharpen." This edition marks a departure from previous runs largely because of the high degree of craftsmanship indicated in the printing, which is done by Lithotone, the most modern development in offset lithography.

The contents of this 48-page booklet is based on the practical experience of experts. A careful perusal of it is sure to prove beneficial to both teachers and students of industrial arts and vocational education.

A postal card request mailed to the Educational Service Department of the Behr-Manning Corp. will enable all interested parties to obtain a copy.

"ABC OF SPRAY PAINTING EQUIPMENT"

The DeVilbiss Co., Toledo, Ohio, announces their new booklet entitled "ABC of Spray Painting Equipment." This booklet contains practically all of the answers to the questions commonly asked about the operation and use, care, and adjustment of spray- painting equipment. It was written to satisfy the many requests for a simple booklet which would provide the groundwork for a general understanding of all the basic principles involved. The booklet is divided into five parts as follows: (1) Spray Guns, (2) Material Containers, (3) Hose and Connections, (4) Air Transformers and Condensers, and (5) Air Compressing Outfits. It is very comprehensive and very ably covers the subject. It can be obtained from the DeVilbiss Co. at a price of 25 cents.

OZALID EXHIBIT

The Ozalid Corp., New York, N. Y., exhibit which was used at the New York World's Fair last year, has been dismantled and removed to the New York Metropolitan Sales Office at 354 Fourth Avenue. Visitors who come to New York are invited to the Ozalid Corporation offices where they may witness a demonstration of the Ozalid process. The latest Ozalid machines are on display and a trained operator is on hand at all times to explain the operation and features of Ozalid equipment.

"BETTER GRINDING IN YOUR TOOLROOM"

This new six-color booklet has just been announced by the Cincinnati Milling Machine and Cincinnati Grinders Inc., Cincinnati, Ohio, and describes the various grinding machines and grinding equipment put out by this company.

Another booklet just announced by this company is entitled "The Use of Abrasives for Removing and Finishing Metals," and should prove especially interesting and helpful to those executives in charge of grinding-machine operators and apprentices.

Copies of both these booklets can be obtained by writing to the Cincinnati Milling Machine and Cincinnati Grinders Inc.

SKILSAW'S NEW CATALOG

Skilsaw, Inc., Chicago, Ill., has just announced a new catalog, No. 41, in which the complete line of Skilsaw tools is illustrated and described. The catalog presents the organization behind Skilsaw tools, and outlines the many practical uses for these tools and the manufacturing practices behind them. The following tools are illustrated and described in detail: hand saws, drills, belt sanders, hand grinder, disk sanders, blowers, floor sander, and bench grinders.

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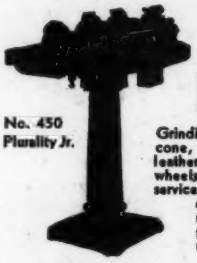

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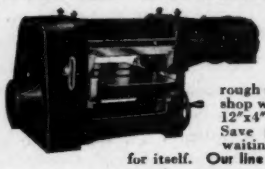

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Wood Finishing and Painting Made Easy

By Ralph G. Waring. Cloth, 220 pages, 6 by 9. Price, $2.75. Published by The Bruce Publishing Co., Milwaukee, Wis.

This book, written by a man who has had wide experience as a teacher of industrial-arts work, and as a research expert and consultant in industrial finishing problems, will be found exceedingly helpful by teachers of industrial-arts work, homeowners, and homecraftsmen.

It contains explicit directions both for the preparation of the surface, and for the application of the finish. Brush as well as spraying methods are thoroughly explained.

Acceptable equipping of the paint shop, and finishing specifications for the various woods and materials are discussed.

There are also chapters on toy and marine finishes.

A very complete glossary is appended.

Commercial Art

By C. E. Wallace. Cloth, 236 pages, 7 by 9¾, illustrated. Price, $2.50. Published by McGraw-Hill Book Co., New York, N. Y.

A revised edition of this graded course combining drawing, designing, and lettering. The introduction contains valuable vocational-guidance material.

The book contains seven chapters devoted to the following subjects respectively: Essentials of Graphic Design, Representative Drawing, Lettering, Pen-and-Ink and Wash Drawing, Color and the Poster, Layout in Advertising, and Processes of Reproduction.

Units in Patternmaking and Founding

By Robert E. Smith. Paper, 72 pages, 8 by 10¾. Price, 42 cents, illustrated. Published by McCormick-Mathers Publishing Co., Wichita, Kans.

This handy booklet divides the subject of patternmaking and founding into 17 information units, and discusses them under the following captions: Safety, Patternmaking, Technical Terms Applied to Patternmaking, Pattern Materials and Accessories, How to Make a Simple Pattern, How to Make a Simple Split or Parted Pattern, How to Build a Pattern by the Segment Process, Core Prints and How to Make Them, How to Make Core Boxes, Molding Materials, Foundry Sand, Molding Tools and Equipment, How to Prepare Sand for Molding, Selecting a Flask and Arranging Patterns, How to Ram a Mold, How to Form an Irregular Joint, How to Patch a Torn or Broken Mold, How to Make a Sand Core, How to Set a Core, Furnaces and Ovens Used in Foundry Practice, Identification of Metals, How to Prepare and Pour Metal, How to Remove Gates and Clean Castings, Aluminum, Antimony, Copper and Copper Alloys, Iron and Steel, Wrought Iron, Lead, Tin, and Zinc.

Design for the Craftsman

By Franklin H. Gottshall. Cloth, 149 pages, 8 by 10⅞. Price, $2.75. Published by The Bruce Publishing Co., Milwaukee, Wis.

Written by an expert, this book will be found very helpful by teachers of industrial-arts work and by homecraftsmen, who are interested in the design of the projects on which they lavish their money, time, and energy.

The elements of design are thoroughly explained, and their application is illustrated by numerous examples bringing in a variety of materials and uses. Ornament and its application to design is dwelled upon, as is also color, color harmony, and the application of color to design.

The final chapter is devoted to a step by step discussion of how the rules of design are applied to a given problem.

The Promise of Tomorrow

By Walter E. Myer and Clay Coss. Cloth, 541 pages, 6⅛ by 9¼. Price, $2.50. Published by Civic Education Service, 744 Jackson Place, Washington, D. C.

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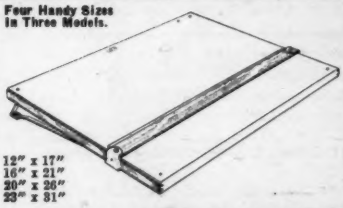

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